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AN ANALYSIS OF UNITED STATES AIR FORCE
SUPPLY SUPPORT IN VIETNAM

THESIS

Randall P. Ray
Major, USAF

AFIT/GLM/LSM/87S-58



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SUPPLY SUPPORT IN VIETNAM

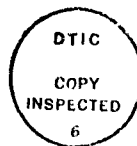
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AIR FORCE SUPPLY SUPPORT
IN VIETNAM

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

Randall P. Ray, B.S., M.B.A.

Major, USAF

September 1987

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Table of Contents

	Page
Acknowledgments.....	ii
List of Figures.....	v
List of Tables.....	vi
Abstract.....	vii
I. Introduction.....	1
General Issue.....	1
Statement of Problem.....	3
Scope.....	4
II. History of U.S. Involvement.....	7
Background.....	7
Beginning U.S. Involvement.....	10
Commitment of U.S. Combat Forces.....	15
III. Air Force Supply Policy and Management.....	21
Geographical Characteristics and Supply Infrastructure.....	21
Supply Support - Initial Operating Concept.....	23
U.S. Force Buildup and Associated Supply Problems.....	28
"Push" Supply Programs.....	31
Problems Associated With "Push" Programs.....	37
IV. Air Force Supply and Supply Sub-Systems.....	49
Wholesale Supply versus Base Supply.....	49
Wholesale Supply.....	50
Base Supply.....	58
Services.....	61
Subsistence Support.....	62
Exchange Services.....	65
Uniform Clothing Support.....	66
Recreational Services.....	66
Petroleum, Oil, and Lubricants (POL).....	67
Air Munitions.....	72
Common Supply.....	77

V.	Lessons Learned and Recommendations.....	81
	MOB/FOB Concept of Operation.....	81
	STAR Resupply.....	81
	Push Supply Procedures.....	82
	Logistics Personnel Deployment.....	83
	Gray Eagle (Harvest Eagle).....	84
	Computer Support of Supply Operations.....	84
	Computer Personnel Training.....	85
	Personnel - Tour of Duty.....	86
	Supply Storage Facilities.....	87
	Excesses.....	87
	Wholesale Supply System.....	88
	DSA/GSA Support.....	88
	Subsistence Support.....	89
	Exchange Services.....	90
	Recreational Services.....	90
	POL.....	91
	Air Munitions-Incomplete Rounds.....	92
	Air Munitions-Lack of Qualified Personnel.....	93
	Air Munitions Stockpiling.....	93
	Air Munitions-Floating Storage.....	94
	Single Manager Supply of Common Items.....	94
	Combat Supply Requirements.....	95
	Wartime Commitment.....	95
	Logistics History.....	96
	Bibliography.....	98
	Vita.....	101

List of Figures

Figure	Page
1. Southeast Asia.....	8
2. Indochina.....	13
3. 1965-66 NORS Rates.....	26
4. 1967-69 NORS Rates.....	27
5. A.F. Distribution System.....	51
6. Corps Tactical Zones.....	70

List of Tables

Table	Page
1. Supply Effectiveness.....	45
2. Annual NORS Rates.....	46

Abstract

↙ U.S.
This study investigated the ~~United States~~ Air Force (USAF) supply support network that existed throughout the Vietnam War. The analysis concentrated on supply related problem areas and associated lessons learned with the intent to prevent similar occurrences in future conflicts.

The research was limited to USAF supply operations in Vietnam as ^{there} they existed in the early sixties when USAF requirements were minimal, to the evolution of a significantly more sophisticated structure which was essential for support of steadily increasing force levels. Included is a historical background of the Vietnam War which describes the events which steadily drew the United States into the conflict and the resultant USAF force buildup. The historical background provides a perspective from which to view supply related problems as the USAF logistics function transitioned from a peacetime orientation to a wartime support structure.

USAF supply initiatives designed to meet the demands of increased combat operations are discussed. Included are AFLC sponsored supply programs such as GRAY EAGLE and BITTERWINE which "pushed" supply items into Vietnam automatically. The wholesale and base supply systems, and the critical relationship that existed between these functions during the Vietnam era is also examined. The supply functions of services, petroleum, oils, and lubricants (POL) and munitions

are studied with the intent to identify particular problem areas in each of the sub areas mentioned and the deliberate steps taken to correct those problems. The employment of common supply support in Vietnam is also presented.

The study concludes with a summary of supply related lessons learned along with recommendations made to preclude recurrence. The objective of the study was supply support shortfalls which degraded the combat capability of USAF forces in Vietnam.

AN ANALYSIS OF UNITED STATES
AIR FORCE SUPPLY SUPPORT
IN VIETNAM

I. Introduction

General Issue

The purpose of this research effort was to provide a concise, yet comprehensive document detailing the United States Air Force supply support network that existed throughout the Vietnam War. The intent was to concentrate on supply related problem areas, and associated lessons learned, to help prevent similar occurrences in future conflicts. As stated by James A. Huston in the preface to the Sinews of War:

History sometimes yields lessons of direct applicability which too often go unrecognized and unheeded.....presumably on the naive assumption that this time everything is different (1:viii).

However, history has proven that events often repeat themselves. In fact, the possibility of U.S. involvement in a limited conflict similar to Vietnam is an ever present reality. Continued instability in the Middle East, characterized by the Iran-Iraq War and the Arab-Israeli conflict, and most recently, the attack on the USS Stark in the Persian Gulf, represents a situation where the potential

for U.S. involvement in a limited war is very high. And, like Vietnam, logistics support of U.S. forces in the Middle East would require a tremendously long supply pipeline. It is therefore imperative that the supply infrastructure established in Vietnam, along with the problems encountered, be examined in depth to permit today's, and future, logistics planners to learn from the Vietnam experience and apply those lessons to supply strategy.

This study analyzed the Air Force supply support structure as it existed in the early days of the Vietnam conflict, including problems encountered as increased U.S. combat involvement placed greater demands on a system more geared to peacetime operations. The study also identified the evolution of the conceptual supply doctrine into an effective, real world system, supportive of operations in Vietnam, and that effort is also reported. Included is a study of the effectiveness of the "single manager concept" whereby the Army and Navy acted as single source managers of common supply items used by the military services in Vietnam. Finally, an analysis of specific supply lessons learned and the ramifications of those lessons applied to current supply posture is presented.

The importance of a historical perspective is best summed up by General Douglas MacArthur who stated:

More than most professions, the military is forced to depend on intelligent interpretation of the past for signposts charting the future. Devoid of opportunity, in peace, for self-instruction through actual practise in his profession, the soldier

makes maximum use of the historical record in assuring the readiness of himself and his command to function efficiently in an emergency. The facts derived from historical analysis, he applies to conditions of the present and the proximate future, thus developing synthesis of appropriate method, organization, and doctrine. (2:Backcover).

It is therefore through historical perspective that we are able to gain insight into future requirements, tailoring current programs to achieve those ends. One of the foremost logisticians of our times, Rear Admiral Henry E. Eccles, once stated "the history of war is full of the disastrous consequences of taking things for granted and of refusing to learn from past experience" (3:23).

Statement of the Problem

A number of sources exist which describe various facets of the United States Air Force (USAF) supply operations in Vietnam. For example, Monograph 17 of the Joint Logistics Review Board (JLRB) contains a general description of supply related management within the four services during the Vietnam era. Within each service the analysis is further broken down into two major areas (4:3):

1. Supply management in CONUS as it related to overseas support and associated problems and
2. Supply management and control of material overseas with special emphasis on supply management in Vietnam.

The description of supply operations covers the period 1965 through 1969 and includes specific supply lessons learned.

A second major source document pertaining to USAF supply operations in Vietnam is contained in the Working Paper For

Corona Harvest Report on USAF Logistics Activities In Support of Operations in Southeast Asia 1 January 1965 through 31 March 1968 - Logistics Sub-System-Supply. The document provides "an analytical evaluation of USAF supply activities during the time period mentioned, including lessons learned and appropriate recommendations" (8:vi). In addition to these two major sources, numerous secondary sources were discovered which also provided pieces of the puzzle about supply operations in Vietnam from the early to mid sixties on to the end of the decade.

As research into the subject area continued it became more obvious that a need existed for a single, USAF supply document relating the Vietnam experience. The document would need to provide an analysis of selected USAF supply operations during the Vietnam conflict, along with problems encountered and lessons learned, in order to provide present and future logistic planners appropriate guidance. This study, then, was completed to provide such a document.

Scope

The scope of this research was limited to USAF supply operations in Vietnam as they existed in the early sixties when USAF requirements were minimal, to the evolution of a significantly more sophisticated supply structure which was essential for support of the vastly increased force levels in place at the end of that decade. The lessons learned during this period of logistics buildup are especially relevant to

today's planners in providing insight into future supply operational requirements.

In order to understand how supply operation changed as a result of increasing United States involvement, Chapter II contains a historical background of the Vietnam War. This background outlines the events which steadily drew the United States into the conflict and the resultant USAF force buildup, eventually peaking in 1969. The intent of the historical background is to create a perspective from which to view supply related shortfalls as that logistics function transitioned from a peacetime orientation to a wartime support structure.

Against the historical backdrop, Chapter III outlines the Air Force supply policy and management system as it existed at the beginning of the U.S. military involvement in Vietnam. Included are changes instituted to enable that system to become more responsive to Air Force supply requirements as increased force levels in Southeast Asia placed greater burdens on that system. Specifically addressed are supply support projects such as GRAY EAGLE (later called HARVEST EAGLE) and BITTERWINE and the impact these programs had on the in-being supply system. The interface with the Pacific Air Force (PACAF) supply management is also reviewed in the Chapter.

Chapter IV consists of an analysis of the major components of the supply system in Vietnam. This includes base supply and wholesale supply and the relationship between

the two. In addition, the supply functions of services; petroleum, oils, and lubricants (POL); and munitions are examined. The intent of the analysis was to identify particular problems in each of the sub areas mentioned and the deliberate steps taken to correct or rectify those problem areas. And, finally, the chapter contains a discussion of the merit of the common supply system used in Vietnam along with potential drawbacks of such a system in future conflicts.

Chapter V consolidates the supply lessons learned from the Vietnam War and actions taken/recommendations made to preclude recurrence. The primary objective of this chapter was to identify those supply support shortfalls which limited the combat capability of USAF forces in Vietnam. The chapter closes with overall recommendations and concluding remarks.

II. History of U.S. Involvement

It is difficult to fully comprehend the problems faced by the USAF supply function in Vietnam as a result of the extensive military buildup beginning in 1965 without examining the events that led to that buildup. Much like the cart before the horse, the massive influx of men and equipment into Vietnam was not preceded by the establishment of a logistics infrastructure designed and manned to handle the monumental requirements caused by that influx. This chapter attempts to provide the historical perspective necessary to understand the events leading to the increased U.S. involvement in Vietnam, and, in doing so, to provide insight into the failure to anticipate support requirements.

Background

The United States' involvement in Vietnam represents the longest conflict in American history.

"Exactly twenty-five years from 1 May 1950 - the day President Truman authorized the first U.S. military assistance to Indochina - Saigon and the South Vietnamese government fell to the communist regime of North Vietnam, on 30 April 1975 (6:vii).

Initial "military assistance" in the early fifties consisted primarily of financial support to the French forces fighting in Vietnam. The French, with Allied approval, had returned to Indochina following World War II to reconstitute its colonial holdings (see Figure 1). This was resisted by some Vietnamese and war ensued. "By 1954, the United States

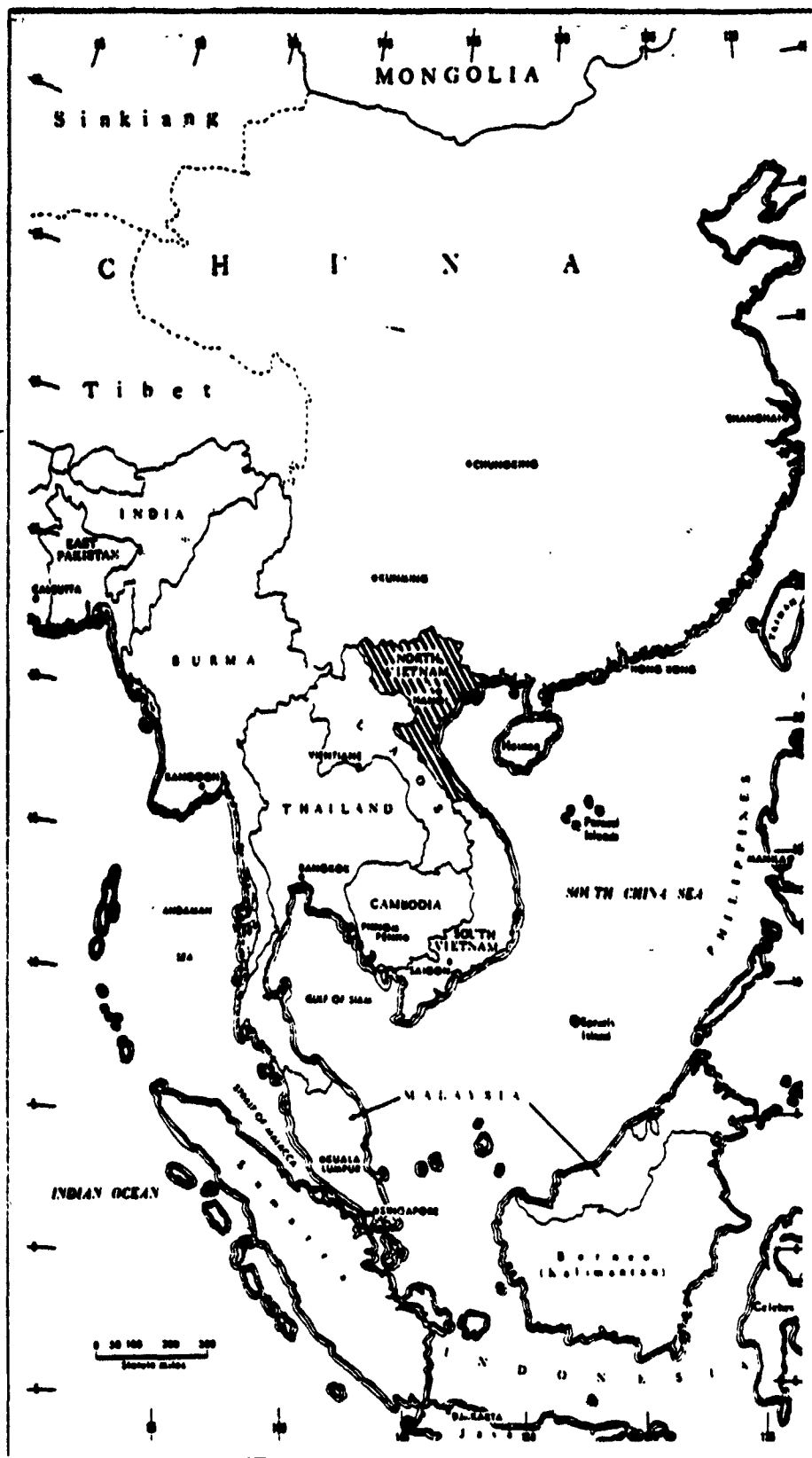


Figure 1. Southeast Asia

was bearing about three-fourths of the war's financial costs" (6:6). A 1954 request from France for direct U.S. combat support was refused by President Eisenhower. Although reportedly sympathetic to the French cause, Eisenhower was unwilling to commit the large U.S. fighting force his top military aides indicated would be needed to make a significant difference in the war.

Backed by substantial Chinese military aid beginning in the early 1950's, the Viet Minh (later Viet Cong) forces began to inflict heavy losses on French forces. Their underestimation of the enemy's fighting capability led to a series of French defeats at the hands of the Viet Minh forces, culminating in the fall of Dien Bien Phu in early May 1954 (6:6). This defeat signaled a turning point in France's efforts to maintain colonial control in Indochina. Having lost its will to continue the war, France signed the Geneva Agreement (20 July 1954) which "provided a working plan for the smooth transition of power from the French government to the Vietnamese, thus ending French colonial rule in Vietnam" (7:19). In addition, the agreement divided Indochina into four parts, creating the countries of Laos, Cambodia, and North and South Vietnam. The division of Vietnam at the seventeenth parallel (see Figure 2) established a communist government in the north under the Viet Minh and its leader, Ho Chi Minh, while, in the south, the French were charged with transferring control to a Vietnamese government. The transition was to take two years, "after which elections were

to be held to determine whether the divided country wished to be reunified" (7:19).

Beginning U.S. Involvement

In December 1954 President Eisenhower signed a formal agreement with France and South Vietnam to provide military assistance, in the form of U.S. advisors, to South Vietnam. This translated into the establishment of the U.S. Military Assistance and Advisory Group - Vietnam (MAAG-V) which "was to create a conventional South Vietnamese Army whose primary mission was to defend the country from external attack. And so the die was cast that directly involved the United States in a war over the control of Indochina" (6:6).

Conflicts between U.S. and French objectives in South Vietnam led to the displacement of the French by the U.S. over the two year period of 1955 and 1956. The main conflict centered on U.S. foreign policy at the time, which sought to pressure European nations to give up colonial holdings throughout the world. In the eyes of some of our allies, we were establishing a similar U.S. arrangement in Vietnam. This position "seemed hypocritical to our European friends, who consequently remained unwilling to support the United States in Vietnam throughout the war" (6:7).

In July 1955, the American-supported Premier of South Vietnam, Ngo Dinh Diem, cancelled plans for reunification elections claiming that free elections would be impossible in North Vietnam. This action provided a catalyst for renewed

conflict in Vietnam, with the U.S. assuming the protectorate role previously held by the French.

In the period from 1955 to 1958, there was little communist insurgency or terrorist activity within Vietnam. However, during this time, the Viet Cong (South Vietnamese Communists) were establishing a guerrilla-militia structure throughout South Vietnam. This structure consisted of three levels of fighting forces based on regional divisions. At the lowest level was the hamlet militia, partially armed units composed of between 30 and 50 local citizens. Village guerrillas, who formed the next level, were better armed and performed a wider range of duties. And finally, district and provincial soldiers who, unlike the hamlet militia or village guerrillas, were engaged in full time military operations. The objective of the Viet Cong was to create a political and military infrastructure in regions throughout South Vietnam which could support guerrilla operations. By the end of the decade armed terrorist attacks had increased sharply as the Viet Cong struck from these secure bases in the countryside of South Vietnam (6:8). This function of the Viet Cong's force structure and tactics was almost universally misunderstood by the Americans, and even by the South Vietnamese, especially in the early years of our involvement. Initially, U. S. leaders, political and military, perceived the threat to South Vietnam to be physically located north of the 17th parallel. Because of this they were "slow in recognizing the serious threat posed

by subversion; infiltration, and guerrilla warfare - specifically the tactics of the Viet Cong in South Vietnam. Even after the need for paramilitary forces to counter the threat was recognized in the 1959-60 period, U.S. assistance for such forces was not provided in adequate amounts until 1964" (6:9).

At the time of the deteriorating military and political situation in Vietnam, John F. Kennedy was elected U.S. President and assumed the office in 1960. Although steadfastly supportive of South Vietnam, Kennedy was reluctant to commit U.S. combat troops to counter the increasing Communist presence in South Vietnam which, at the time, was reported to control more than 75 percent of the country (see Figure 2) (7:28). Additionally, growing pressure from Congress against direct military involvement in Vietnam, and a drop in public confidence because of the failed Bay of Pigs invasion in Cuba, prompted Kennedy to take a different course of action. Instead of combat forces, the new president elected to send support groups such as reconnaissance and intelligence units. In addition, the United States concentrated on reorganizing the Army of the Republic of Vietnam (ARVN) under the Military Assistance Command, Vietnam (MACV), a new command created in February 1962. The reorganization effort was assigned to Special Forces personnel in the role of combat advisors. This group, comprised of highly trained paratroopers specially trained in guerrilla and insurgency type operations, soon came to be

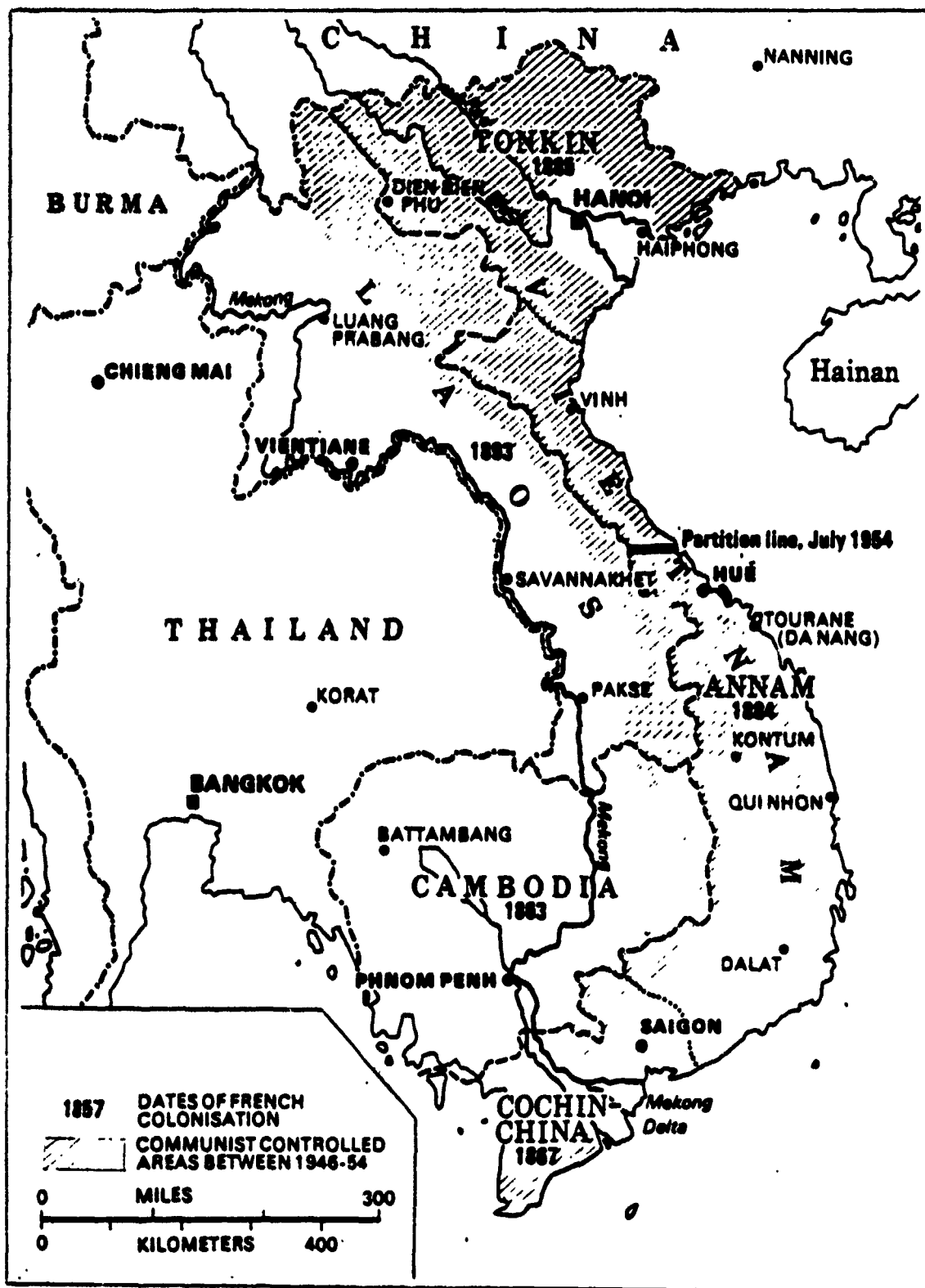


Figure 2. Indochina (7:14)

known by their distinctive berets - the Green Berets. During the early sixties "more than 5000 men would ultimately serve under the classification Special/Combat Advisors in Vietnam" (7:34).

Efforts by U.S. combat advisors to sufficiently train and prepare the ARVN to defeat the Viet Cong were less than successful. One example of the ARVN's inability to develop into a credible combat force occurred in January 1963. In an attempt to neutralize a major Viet Cong radio installation in the village of Ap Boc, one ARVN regiment of infantry with armor support, along with 51 American advisors, was assembled. In the ensuing battle the U.S. advisors directed the ARVN's commanders to press the attack using the techniques and strategies they had been taught. Despite a numerical advantage, both in men and weapons, the ARVN failed to take aggressive action. When the battle ended the ARVN had sustained substantial casualties and there were three Americans dead. However, the battle relayed a more prophetic message to the American people which, more than any other statement, influenced the direction of the war: "Either the U.S. should get out, (which was only media rhetoric) or the U.S. should take control and win the war, which was precisely the mood of the Kennedy administration and the military" (7:44). Thus, in mid 1963, the United States found itself at a decisive crossroad - either pull out completely or increase America's commitment. By this time:

"The United States had already forfeited 50 American lives and more than 400 million dollars with only a

corrupt government, a South Vietnamese army that would not fight, a nation in chaos where the guerrillas ruled the countryside and the people hating the government, to show for it" (7:44).

Commitment of U.S. Combat Forces

The events of the next year, from mid 1963 to mid 1964, proved instrumental in the decision of the United States to become militarily involved in South Vietnam. On 1 November 1963 a military coup resulted in the assassination of President Diem and seizure of power by General Duong Van Minh, leader of the coup. Later, it could be written: "It is now widely accepted that the coup, although officially without American backing except in conscience, was instigated and strongly supported by the U.S. Government and the CIA" (7:49). It was the hope of America's political leaders that Diem's downfall would serve to unite the South Vietnamese under a new leader, focusing national attention against the Viet Cong. Instead "Diem's death caused a loss of continuity of the South Vietnamese government and any momentum achieved in critical government programs supported by the United States" (6:24). In the final analysis, Diem's death provided a political and military morale boost to the enemy.

The second significant event to influence the United States' decision was the assassination of President John F. Kennedy on the 22nd of November, 1963. Whether Kennedy would have committed major U.S. combat forces to Vietnam is obviously a speculative question. However, U.S. force structure planning for 1964 clearly suggests a force level

inconsistent with any plan for a major increase in the U.S. land force commitment to Vietnam (6:25). With Kennedy's death, Vice President Lyndon Johnson assumed Presidential duties. Whatever his motives, whether political or moral, Johnson seemed intent on "saving the honor of the American people" (7:49). He immediately began increasing aid, adding 60 million dollars to the support money already approved for South Vietnam (7:49). He also promised modernization of military equipment "especially aircraft and armored fighting vehicles and assumption of costs associated with a 50,000 man increase in the ARVN force" (7:49). And, more significantly, Johnson began planning retaliatory air strikes against North Vietnam. However, political considerations, specifically presidential elections upcoming in November, prompted Johnson to temporarily shelve such plans. In actuality, retaliatory strikes had already been made against the North. Clandestine raids had been made against North Vietnam by land, sea, and air. Under OPLAN 34A, a joint US-Vietnam effort, allied forces were using in the North methods of destruction and terrorism similar to the tactics the Viet Cong were applying in the South (7:52).

The third, and the decisive, event which prompted U.S. commitment of combat troops to South Vietnam, occurred on 2 August, 1964 when the USS Maddox was attacked by North Vietnamese navy patrol boats. Three days later American aircraft from the carriers USS Constellation and USS Ticonderoga retaliated by bombing North Vietnamese naval

installations, destroying more than 25 vessels. The raid resulted in immediate movement of the North Vietnamese Peoples Army south toward the Demilitarized Zone (DMZ). "That action, plus reports of renewed North Vietnamese attacks on American ships, led the Johnson administration to produce its Southeast Asian Resolution, better known as the Gulf of Tonkin Resolution" (7:53). On August 5th, 1964, President Johnson addressed the United States Congress, requesting passage of that resolution in order "to promote the maintenance of international peace and security in southeast Asia" (8:B1). Approval of that resolution (PL88-408) just five days later marked a U.S. commitment for the first time to support the government of South Vietnam with U.S. combat troops. Thus began the massive troop buildup which would continue unabated until early 1969.

"By 1965, it became obvious that a rapid buildup and employment of U.S. combat forces was needed to prevent the complete collapse of the South Vietnamese government" (9:6). Yet, although the Gulf of Tonkin resolution committed support in terms of U. S. combat troops, as late as March 1965, according to a statement by the Commander of the Military Assistance Command - Vietnam (MACV), General William C. Westmoreland, "no decision had been taken on U.S. intervention with ground forces, other than the limited Marine security force deployed to protect the Da Nang Airfield" (quoted from 9:6). As a result, there was no logistics system in being in Vietnam, nor was there an

effective logistics plan because there appeared to be no visualization of the massive deployment of men and equipment which would eventually be required in Vietnam. And, with a total force structure in Vietnam of just over 29,000 U.S. military in March 1965, there was little need for a complex, highly responsive supply network. But, in just six months the total U.S. force in South Vietnam more than quadrupled to 132,300 military personnel. This buildup continued over the next four years, reaching a peak of 542,400 U.S. military personnel in January of 1969 (9:14). Along with this rapid manpower buildup, there was an associated buildup in country of advanced weapon systems to support the war effort. This combination of men and weapons flowing into South Vietnam required a tremendous logistics network for basic support needs - an infrastructure which in the early days of the buildup was not designed or prepared to handle the workload generated by the influx of men and materials.

In terms of United States Air Force levels, "PACAF strength, starting at some 40,000 personnel in January 1965, steadily increased to 130,000 by July 1969. Within this total, Southeast Asia (SEA) personnel increased from just over 10,000 to about 96,000 during that period" (10:I-1-9). As indicated, there was nearly a 10 fold increase in AF personnel in SEA over the four and a half year period.

During the same period there was also a significant increase in the number of tactical fighter wings, squadrons, and aircraft in the AF which was a direct consequence of

hostilities in Vietnam. "Tactical fighter units started at 22 wings with 89 squadrons and 1,750 aircraft on 1 January 1965. The force peaked at 29 wings, 103 squadrons, and 2,070 aircraft. The force decreased to 24 wings, 90 squadrons and 1,815 aircraft by 1 July 1969" (10:I-1-9). The most noteworthy increase took place in USAF counterinsurgency operational forces in SEA which increased from 5 squadrons with 100 aircraft in January 1965 to 16 squadrons and 200 aircraft in July 1969; increases of 220% and 180% respectively (10:I-1-9).

This time period also saw considerable force modernization with the introduction of the F-4 and RF-4 aircraft to tactical organization inventories. The Military Airlift Command (MAC) also began employing its first long range strategic airlift aircraft, the C-141 Starlifter. And in March 1968, the Tactical Air Command (TAC) began receiving the swept-wing F-111 which saw limited duty in the latter stages of the Vietnam conflict (10:I-1-9). Each of these weapon systems, when used in support of the war in SEA, required the complete support system associated with it (ie. aerospace ground equipment (AGE), unique test equipment, specialized maintenance equipment, spare parts, etc.) thus placing additional strain on the already inadequate in-place supply system.

As established by the numbers cited, the period "from the Gulf of Tonkin Incident in 1964 until the Tet Offensive of 1968 the Vietnam Conflict would require more commitment

than was ever foreseen" (7:58). It was a commitment which presented a Herculean challenge to logistic planners who had to create and manage a 10,000 mile life line to Southeast Asia in support of combat requirements. Although there were many problems, those involved in logistics did a superb job overall. As stated by General William C. Westmoreland:

As a result of successes achieved by our logisticians U.S. forces were never restricted in combat operations by a need for essential supplies, and enjoyed the highest quality of personal services ever provided to troops in combat (10:11).

III. Air Force Supply Policy and Management

This chapter describes the USAF supply system as it existed in South Vietnam prior to the troop buildup beginning in mid 1965. The change and growth of that system, along with the myriad problems encountered, as a result of "reactive" measures taken to provide continuous combat support, is also presented. Included is an analysis of "push" type resupply programs designed to move large quantities of supply items into South Vietnam based on anticipated requirements.

Geographical Characteristics and Supply Infrastructure

A number of factors combined to make the logistics support of U.S. combat forces in South Vietnam a major challenge. Primary was the development of a responsive and effective pipeline which extended 10,000 miles from the Air Material Areas (AMAs) in the Continental United States (CONUS) to air bases in the Republic of Vietnam. Although extensive supply pipelines were developed during both World War II and the Korean War to support combat forces in east Asia and the Pacific, the requirements in Southeast Asia were decidedly different. As it turned out, the war in Vietnam lasted longer than World War II or the Korean War; and overall supply requirements, especially in terms of greatly increased munitions usage and far more personal service provisions (large BX's, gymnasiums, Olympic size swimming

pools (11:191)), placed a tremendous burden on that lifeline".

A second factor which severely hampered development of an effective logistic support infrastructure was the harsh terrain and climate found in South Vietnam. The topography, made up of swamps, jungles, deltas, plains, and mountains, made it extremely difficult to develop a workable logistic support structure capable of supporting combat operations. According to Lt. General A. T. McNamara "the country's primary internal transportation system consisted of 1400 miles of primary and 700 miles of secondary canals which could accomodate canal barges, small motor junks, and sampans carrying freight and passengers. Two-thirds of South Vietnam's 15,000 miles of roadway were paved and the remainder were in poor condition. The system was bottlenecked by its narrowness, many ferry crossings, sharp curves, steep grades and low bridge clearances" (15:23). Climatic conditions, typified by hot and dry, or hot and rainy, seasons, and seasonal monsoons, further exacerbated conditions for logistic planners in terms of providing adequate supply storage and security for stored items.

And, finally, Vietnam, in the early sixties, was a primitive country with a mainly agrarian population, lacking in even the most basic of a national logistic infrastructure, further complicated support efforts. The local economy had little support capability to draw from for U.S. forces.

Supply Support - Initial Operating Concept

Before President Johnson's commitment of combat forces to Vietnam, these factors were more an inconvenience than a deterrent to supply support operations to USAF forces in-country. As mentioned previously, there were just over 10,000 USAF personnel in the whole of SEA in January, 1965. In terms of weapon system support, USAF tactical units in-country operated small numbers of conventional (reciprocating engine) aircraft from unsophisticated airfields within South Vietnam. These units were permanently assigned to the Republic of Vietnam and "possessed their own maintenance capability and received supply support through the one base supply, in-country, located at Tan Son Nhut Air Base in Saigon" (5:III-1-5). This supply account, established in 1962 with approximately 1000 line items had grown to 50,000 line items by 1965 and, using a manual accounting system, was rapidly becoming unmanageable (5:III-1-6).

Under the operative concept employed at the time, tactical units possessing jet aircraft rotated from PACAF and CONUS locations to Forward Operating Bases (FOBs) in SEA on a temporary duty (TDY) basis for a period of 30 days. As of 1 January, 1965 there were three FOBs in Vietnam, located at Bien Hoa, Da Nang, and Tan Son Nhut Air Bases (5:6). See Figure 3. In order to function at a FOB, the unit deployed from its respective home station with an entire complement of operational and support personnel, plus weapon system support equipment and supplies in the form of war readiness spare

kits (WRSK). These kits were air transportable and designed to sustain two flying hours a day, per aircraft, for thirty days. During the thirty day rotation only minor maintenance was performed at the FOB and it was principally "remove and replace" of malfunctioning components (12:xviii). There was no in-country supply point for the deployed forces flying jet aircraft. Tan Son Nhut Air Base supply supported only conventional reciprocating engine aircraft. Therefore, a variety of methods was employed to replace items used from the WRSK. One method was Speed Through Air Resupply (STAR). This concept was devised in 1955 to support TAC mobility plans which called for logistic support of units engaged in rotational operations. STAR allowed deployed units to requisition required items direct from a dedicated system manager (SM) in the Air Force Logistics Command (AFLC) who would ship the desired item(s) by air directly to the deployed location. "The Star concept continued into this period but did not have the capacity nor was it intended to support the magnitude of effort into which SEA developed" (12:xx).

The remaining maintenance requirements, which were substantial, were performed by the Main Operating Base (MOB) at Clark Air Base in the Philippines. "The MOB, farther removed from the combat than the FOB, was equipped and manned to provide greater support. The MOB was responsible for the total organizational/field-level maintenance of all wing aircraft deployed to the FOB, including periodic inspections

on aircraft and cold section repair on jet engines" (13:18). The idea was to perform the more involved maintenance functions away from the combat environment where more sophisticated and expensive test equipment was available. At the time there was no logistics support base nearer than Clark Air Base; "designated the hard core support base for Southeast Asia" (14:27). In addition to Clark, MOBs were located at Kadina and Naha Air Bases in Okinawa, and at Tachikawa, Yokota, and Misawa Air Bases in Japan.

By the end of 1965 it became increasingly evident the FOB/MOB concept was not achieving the results envisioned. "Shuttling aircraft between MOBs and FOBs was time consuming and wasteful of operational flying hours. But, more importantly, limited supply stockage at the FOBs was causing Not Operationally Ready for Supply (NORS) rates to reach unacceptable levels" (5:III-1-8) (see Figures 4 and 5). This was severely jeopardizing the combat capability of USAF forces in Vietnam.

During the mid sixties four important events occurred which resulted in greater U.S. involvement and, consequently, continual increase in logistic support requirements. The first occurred in late January 1965 when General Westmoreland, Commander of the U.S. Military Assistance Command Vietnam (COMUSMACV), requested and obtained approval to use jet aircraft against Viet Cong concentrations in South Vietnam. This was in response to increased Viet Cong guerrilla activity and subversion. A second event involved

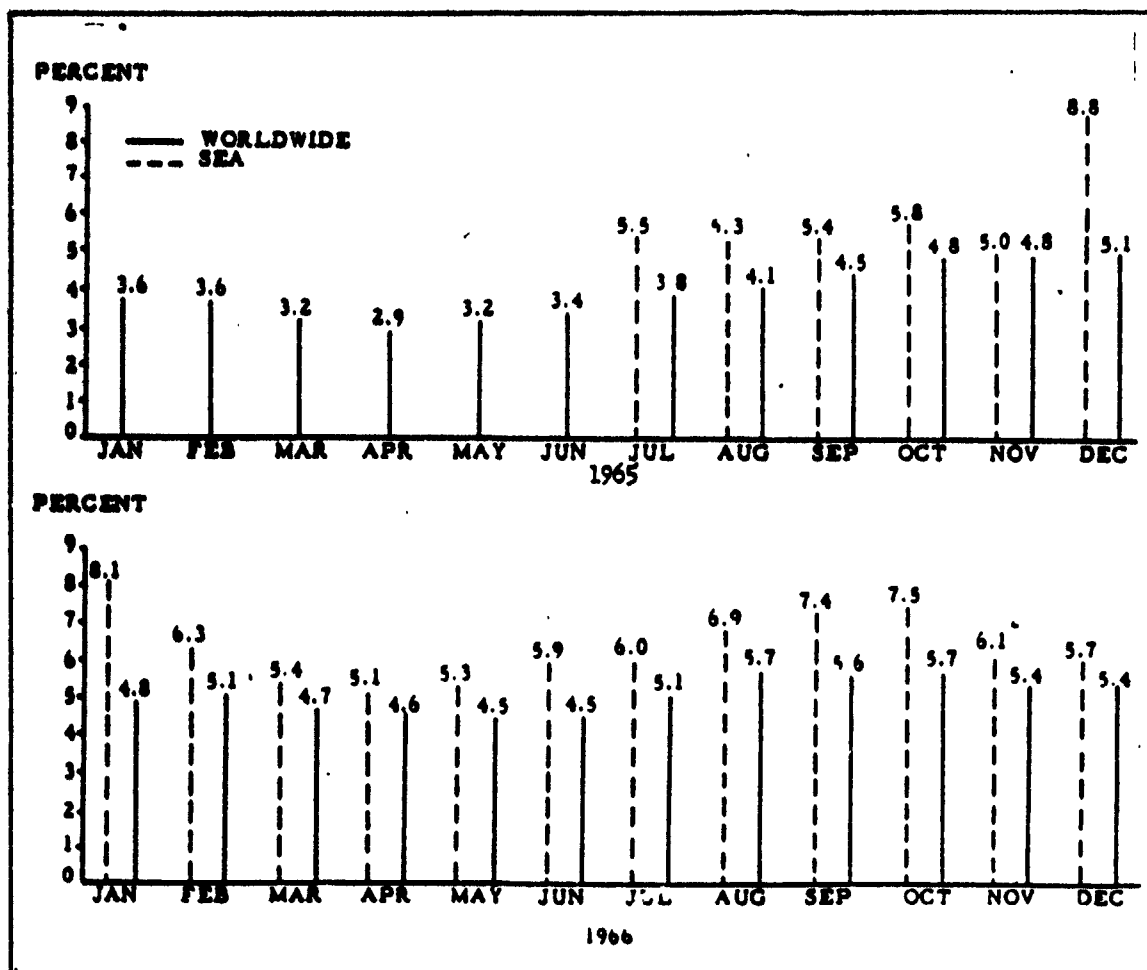


Figure 3. 1965-66 NORs Rates (5:III-1-35)

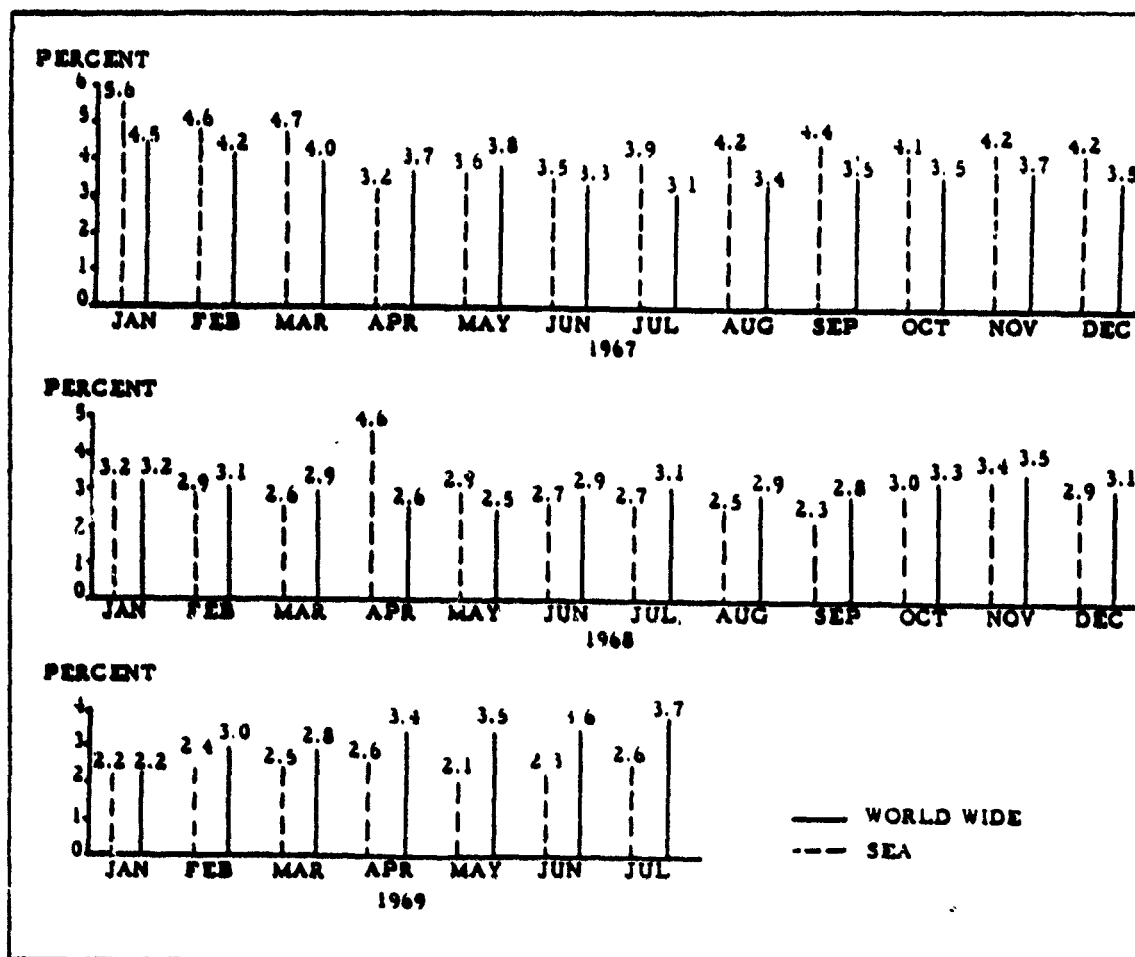


Figure 4. 1967-69 NORS Rates (5:III-1-35)

the decision by President Johnson in March 1965 to strike targets in North Vietnam. Unlike earlier attacks in the North which had been retaliatory in nature, the decision to launch limited offensive air strikes against North Vietnam was a move designed "to defeat the Communist plague at its point of origin" (7:49) and bring about a negotiated settlement. A third factor which drew the U.S. further into the war was the decision in June 1965 to use B-52s to bomb North Vietnam. Although the B-52 aircraft were to operate out of Guam, there would, nevertheless, be new and additional requirements for logistic support and a subsequent increase in the pipeline of parts, equipment, and supplies to the Pacific area. And, finally, in late 1965 the USAF decided to change the personnel deployment policy from 30 days TDY to a one year permanent change of station (PCS) for personnel of tactical units. This was the move which provided the impetus for establishing MOBs within South Vietnam (4:II-1-7/8).

Each of these decisions contributed to a greater feeling of permanence regarding U.S. involvement in the war in Vietnam. Collectively, the decisions signalled a change in the mind-set of top government and military officials that the war in Vietnam was obviously not going to be a quick victory for U.S. forces. The events also signified a marked escalation in U.S. combat force involvement in Southeast Asia.

U.S. Force Buildup and Associated Supply Problems

The escalation of the war in Vietnam and the rapid

increases in force levels and weapon systems in-country caused a number of significant problems for logistics planners early in the war. As mentioned above, the Air Force, in late 1965, changed its personnel deployment policy from 30 day rotational TDY to one year PCS. This resulted in the need for additional and improved supply and maintenance capability at the deployed locations which was not available under the then-current FOB concept. In addition, the unacceptably high NORS rate was being blamed on the reliance of tactical units on the distantly located MOB for all other than the quick "remove and replace" maintenance. As indicated in Figures 4 and 5, the NORS rate in SEA for December 1965 and January 1966 was well above worldwide figures and considerably higher than the Air Force maximum standard of five percent. To eliminate the reliance of deployed tactical units on distantly located MOBs, PACAF began to establish MOBs on the mainland of Southeast Asia beginning in late 1965 and through 1966. The transition to MOBs added to the problem of providing adequate supply support to the Pacific (5:III-1-9). As indicated earlier, the only major supply account in Vietnam at the time was at Tan Son Nhut Air Base, which, up to that time, was capable of supporting conventional aircraft only. To help resolve the supply support problems, action was begun to establish sixteen new base supply accounts which would be supplied from one or more of the five air material areas (AMAs) in the CONUS. However, supply support remained a problem and the

NORS rate remained relatively high during the transition period. A primary reason for the poor supply support effectiveness was the fact "the general logistics base in Vietnam was inadequate to meet the needs caused by the escalation of U.S. combat troop deployment" (8:16). And, to further complicate matters, "logistics troops and units were deployed at about the same rate as tactical forces rather than in advance for the timely establishment of an adequate logistic base" (9:8).

The change in maintenance operating procedures from a basic "remove and replace" concept to a full organizational and field level maintenance capability resulted in immediate supply shortages based on the stockage levels associated with MOB supply requirements. Because MOBs were responsible for performing more complicated and intensive aircraft maintenance functions than a FOB, they were authorized substantially greater supply inventory than a FOB. However, when the Air Force decided to establish MOBs within SEA in late 1965, that decision was not preceded by a move to stock the selected bases with authorized supply items. As a result, the transition to MOBs within SEA, and the associated supply requirements of operational units, caused increased NORS rates and a corresponding reduction in combat capability. In addition, the demands placed on supply as a result of the rapid influx of people and equipment into Vietnam placed a tremendous burden on an undermanned, manual supply system.

"Push" Supply Programs

To alleviate the impact of supply shortfalls and maintain an acceptable level of combat capability, a number of creative logistic programs were implemented. One program previously mentioned was the STAR initiative. Although initially effective in supporting the long pipeline operation, its total dependence on airlift made it impractical as supply demands quickly outpaced airlift capability. Toward the end of 1965 two programs, jointly developed by PACAF and AFLC, designated "Bitterwine" and "Gray Eagle", were intended to reduce supply shortages through "push" type resupply. "The term "push" applies to packages of material developed, assembled, and shipped by CONUS supply activities to provide automatic supply to deployed forces. Automatic supply is defined as a system by which certain supply requirements are automatically shipped or issued for a predetermined period of time without requisition (as opposed to a "pull" system which requires a requisition action) by the using unit. It is based upon estimated or experience usage factors" (4:131).

Both programs were initiated to "expedite the transition from the FOB/MOB concept to mainland MOBs and to properly equip the new bases being constructed" (5:III-1-16). The push concept was also meant to provide immediate supply support where the in-place logistic structure cannot, or has not, accurately forecast demand requirements. In the case of Vietnam, the decision to transition to a MOB repair function in-country was not preceded by the necessary supply

requisitions to obtain the minimum item levels commensurate with a MOB maintenance structure.

Project Bitterwine was designed to push the facilities, equipment, supplies, and spare parts necessary to maintain a weapon system in operational ready (OR) status. The push packages, developed to provide for the organizational needs of a 4,000 man base supporting a combat wing, included field maintenance, armament, electronics, communications, and munitions maintenance shops along with equipment and supplies peculiar to the weapon system concerned (5:III-1-16 and 12:xxi). AFLC, in consonance with PACAF, developed a variety of Bitterwine packages tailored to the particular needs of the recipient base. Examples included packages developed to support maintenance shops, civil engineering organizations, food services, and a host of other activities. These kits were put together at the Sacramento Air Material Area (SMAMA) using item inputs from the Defense Supply Agency (DSA), the General Services Administration (GSA), AFLC, and each of the other four AMA's using standard Air Force supply requisition techniques (5:III-1-28). Once assembled, the packages were placed aboard ships at Oakland, California and transported to Vietnam. It is important to note that responsibility for the push packages remained with AFLC which initiated all action without requiring any requisition action on the part of the receiving base supply function.

The volume of base support material pushed to SEA under Project Bitterwine was impressive. "From November 1965

through early 1967, AFLC assembled and shipped over 1,500 functional packages (functional base support packages, aircraft peculiar equipment, and initial supply support kits) involving over 29,000,000 units, 380,000 line items, and 150,000,000 pounds of material costing more than \$81,000,000" (12:xxii). These accomplishments take on even greater significance when viewed from the standpoint that a national emergency was not declared which would have automatically invoked the provisions of emergency war plans priority upgrading. In some estimations, Project Bitterwine was the greatest single supply effort ever accomplished by the United States Air Force (12:xxiii)

The second push program, designated Gray Eagle (known as Harvest Eagle after July 1968), operated concurrently with project Bitterwine. This program was designed to provide the initial housekeeping, messing, and electrical support necessary until fixed facilities were completed. They were employed on bare bases (a base with a runway and water supply) and to augment the facilities already in-being on established bases in SEA (5:III-1-17).

Gray Eagle was the first phase of a three phase program to establish permanent USAF bases in SEA. The three phases included:

1. Gray Eagle action (also known as tent city).
2. Temporary buildings, pre-fabs, shelters.
3. And construction of permanent facilities, runways, and support systems (12:xxi).

The three phase process progressed as follows:

Initially, Gray Eagle (tent city) camps were planned to be built and the aluminum runways and parking areas constructed. Next, temporary buildings, such as prefabs, inflatable shelters, and Butler buildings, were to be erected to house the field maintenance shops and support activities. At the same time, contractors were to construct concrete runways, buildings, and support systems for more permanent use. The total actions were scheduled to take from 2 to 3 years to accomplish (4:136).

As with Project Bitterwine, AFLC coordinated anticipated requirements with PACAF, and then pushed the required items to the user without requiring requisitioning actions. The program was especially critical in providing the essential and basic survival supply requirements (shelter, messing, electrical power, etc) for USAF bare base operations. In total, the Air Force deployed ten Gray Eagle packages to eight different bases in Southeast Asia (5:III-17). Four of these packages were immediately available, having been pre-positioned in the Pacific Command (PACOM) area prior to the beginning of U.S. involvement in Vietnam combat. The remaining six were assembled in the United States using CONUS resources. As the primary user of Gray Eagle packages, Tactical Air Command (TAC) maintained the resources as war readiness material (WRM) at Robins AFB, Georgia, deploying the packages as requirements in Vietnam dictated (5:III-1-17/26).

Gray Eagle packages consisted of four 1,100 man kits which constituted a combination of station and housekeeping sets. Station sets were comprised of basic subsistence items and were intended to supplement existing supplies, or, in the

case of bare base sites, to provide initial rations for a period of 30 days. Housekeeping kits, as implied by the name, provided basic housing, messing, and administrative facilities along with the respective stock items for those facilities (except for the subsistence items for the messing facility which were contained in the station sets).

As bases using Gray Eagle kits progressed into subsequent phases of buildup, the remaining, unused assets from the Gray Eagle packages were used to augment the base operating stocks or were returned to WRM. In fact, as fixed facilities became established, Harvest Eagle (the new name for Gray Eagle) assets were reconstituted to replace the prepositioned PACAF packages used in the early stages of the program. Thus, there were again packages available for future combat exercises or other contingencies as in January, 1968, when three of the Harvest Eagle packages were deployed to Korea in support of arriving units responding to the Pueblo incident (5:III-1-17).

Even though both Project Bitterwine and Gray Eagle were generally perceived as successful operations, there were certainly a number of problems associated with each program.

A primary requirement of the Gray Eagle packages was that the contents be lightweight, durable, functional, and completely air transportable. However, in reality, the kits were generally comprised of vintage World War II U.S. Army equipment which consisted of heavy, bulky, outdated items not originally designed for air shipment. Another problem with

Gray Eagle packages was that they contained a wide variety of items, many of which did not meet the specific needs of bare-base operations in Vietnam. In addition, the shipment of unneeded items such as heating stoves in Gray Eagle packages resulted in excesses at the destination base and the ineffectual use of critical tactical and strategic airlift resources.

To rectify the problems associated with Gray Eagle packages, the "Air Force System Command (AFSC) activated a new management organization, called the bare base project office, to support requirements for tactical and strategic mobility" (5:III-1-26). The purpose of the bare base project office "was to develop and identify by commands, equipment necessary for Air Force operational and support forces to deploy rapidly and operate from bare base sites anywhere in the world" (quoted from 5:III-1-26). The contents of such a kit would include the essential equipment necessary to establish combat operations in a bare base environment. "Under the concept, USAF combat forces could deploy with the newly designed kits to bases with no facilities other than a runway, parking space, and water supply and have an almost instant operating environment" (III-1-27). The packages were also to be engineered and designed to be lightweight and air transportable. By 1968 aluminum and plastic shipping containers were being developed which provided protection for enclosed supply items during air transport. Upon arrival at the designated receiving base, these containers expanded to

several times their original size to become supply shops and living quarters. The items shipped inside these containers were also redesigned to better withstand the deteriorating effects of climatic conditions for all but arctic weather.

Problems Associated With "Push" Programs

A number of problems were also associated with Project Bitterwine which detracted from its overall responsiveness in supporting immediate supply needs in Vietnam from early 1965 until mid-1966. By mid-1966, the need for immediate supply support began to level off as stock levels reached acceptable standards and normal supply requisitioning procedures were reinstituted. One problem pertained to the deployment of Project Bitterwine packages by the Sacramento Air Materiel Area. Initially, Project Bitterwine material flowed on an incremental basis to the port at Oakland where it was loaded "on the next ship" bound for SEA resulting in the arrival of incomplete packages at various times and at various ports in Vietnam. Such random arrivals made it difficult, if not impossible, to reconstitute all components of a particular Bitterwine package for inland shipment to the programmed destination base. Thus, a great deal of material was lost or misdirected and vital timing was destroyed. The problem was resolved, quite simply, by consolidating Project Bitterwine packages for a one-ship-unit move to Vietnam. In one case, over 4 million pounds of Bitterwine material was processed and moved on a single ship to the air base being constructed at Tuy Hoa, Vietnam (4:137).

Earlier it was mentioned that, in just over one-year, more than 380,000 line items weighing more than 150,000,000 pounds were shipped to bases in SEA under Project Bitterwine. The sheer volume of this material created extensive reception and handling problems at destination bases. The cumbersome manual supply accounting system, unsuitable storage facilities, and the lack of adequate, or in some cases, any reception capability at the forward locations severely hampered effective supply management.

Consequently, in the early days of the buildup it was necessary to waive for SEA the supply reporting requirements and other actions normally levied on established bases - such as normal base funding, responsibility for financial inventory accounting, and the supply activity management reports. (Full base responsibilities were restored in 1968) (12:xxiii).

This action created more problems than it solved. Although relief of standard supply procedures saved many manhours, it also meant that there was no longer any method of tracking items as they came in. Therefore, there was no way to know what was, and was not, in stock or where inventory items were located. The loss of item visibility caused inventory excesses because, in many cases, inventory managers reordered items that were actually in stock but not located or known to be received.

Prior to the buildup of personnel and weapon systems beginning in 1965, and the associated increase in supply requirements, inventory management was accomplished satisfactorily using a manual stock record accounting system for in-country support. The massive number of items pushed

to SEA as a result of Projects Bitterwine and Gray Eagle quickly exceeded the capability of the manual supply system to track those items. The accounting problems were further exaggerated by the failure to deploy a sufficient number of trained supply personnel in advance of Bitterwine and Gray Eagle shipments to Vietnam.

In an effort to speed the processing of supply transactions, accounts were semi-mechanized using a punch card accounting machine (PCAM) system starting in mid 1965. However, by December, 1965 it was apparent, based on NORS rates well above the USAF standard of 5 percent, that PCAM could not support stock control at the bases (4:252).

In the meantime, "supply storage became one of the most serious supply problems faced by the United States Air Force in SEA" (4:253). Push programs such as Bitterwine and Gray Eagle caused a tremendous buildup of supplies and equipment, especially in 1965-66, as the Air Force responded to the decision to accelerate the buildup of forces in Vietnam. The receiving and storage of these resources became a major problem due to inadequate or, in many cases, the absence of suitable warehouse space. This problem was further accentuated because "in most instances, commanders assigned the acquisition of real estate and construction of facilities for supply and storage operations a lower priority in comparison with combat support requirements" (4:III-1-84). The lack of suitable permanent storage facilities caused supplies and equipment to be stored either in inflatable

shelters or, in most cases, simply stored outdoors under canvas covers. The inflatable shelters were generally unsatisfactory due to climatic conditions which included:

1. Blowing sand which fouled the motors that provided the air pressure.
2. Torrential rains and winds during the monsoon season which caused the shelters to tear and deflate.
3. And the extremely hot weather which made it nearly impossible to work inside the shelters (5:III-1-84).

Outside storage also proved unacceptable because of the high theft rate attributed to the difficulty encountered in securing those areas. There was also considerable deterioration of supplies and equipment due to corrosion, mildew, and rot caused by the extremely humid conditions. And, finally, the weather and inadequate storage resulted in the obliteration of identifying markings making it impossible to readily determine the contents of many boxed supplies.

The end result was the loss of crucial supply resources through pilferage, damage, and deterioration due to weather. Also, because most items stored outside were not satisfactorily recorded or tracked, the loss of item identity had much the same effect on combat readiness support as did shortages due to pilferage since inventory managers had little idea of what was stored or where it was located in the temporary storage facilities.

The underlying problem confronting the USAF at the onset of the force buildup was the military construction program

laws and regulations which specified the dollar amounts which could be spent during "peacetime" conditions (4:253).

Because the United States had not declared war in Vietnam the programming and funding procedures for Vietnam construction were essentially the same as peacetime military construction appropriations "with their time-consuming procedural road blocks" (16:13). A process that Vice Admiral Edwin Hooper, USN, referred to as "laborious procedures difficult even in more normal times" (17:185). However, in late 1966, the Air Force procured 288 prefabricated buildings to be used as supply and maintenance buildings in SEA, saving millions of dollars of supplies which would have been lost or ruined because of inadequate facilities (5:III-1-84). The fact remains that a significant amount of supply resources had already been squandered because of the failure to recognize storage inadequacies and a failure to anticipate warehouse requirements comparable to the decision to escalate U.S. force involvement in SEA. In comments to the Joint Logistics Review Board, the Commander-in-Chief, PACAF, stated "storage facilities, regardless as to who funds, erects, or provides these facilities must be considered as the initial part of a bare-base contingency operation" (4:256).

With the attainment of suitable storage facilities, there remained the problem of attaining management control of the mountains of supply items which were accumulating on a daily basis at USAF bases throughout SEA. Because standard base supply accounting procedures had been waived, much of

the material in outside storage was not recorded on supply records. This caused inventory managers to requisition supply items which were, in fact, in stock but not available due to the absence of inventory management control. Receipt of the duplicate items added an even greater burden on the workload of supply personnel and created costly supply excesses in the system. As USAF combat capability dropped as a result of increasing NORS rates, two important decisions were made which were aimed at improving inventory management procedures and asset visibility while identifying existing excesses in SEA supply accounts.

The first was a decision by the AFLC in June 1965 to provide supply assistance to USAF bases in Vietnam through Rapid Area Supply Support (RASS) teams. The RASS teams were composed of volunteers from each of the five AMAs, primarily civilians, who possessed supply management skills. The size of these teams grew from a total of 10 supply specialists at each AMA to two 60 man teams (5:III-1-115). These teams would deploy to bases within SEA which were experiencing supply logjams and provide the technical skill and personnel resources necessary to resolve the particular supply problem which existed.

By the end of 1965 RASS teams were already at work at bases throughout SEA helping to establish base supply accounts, conducting basewide inventories, establishing proper levels, processing initial supply support lists, and, eventually, returning large excesses to the CONUS and redistributing assets within the theater (12:xxiv).

The RASS teams were most effective in providing the augmentation needed at the various base supply organizations

to re-establish standard base supply operation while meeting peak workloads. This was especially crucial in the identification, recording, and storage in permanent supply buildings of those supply items which had previously been stored outdoors or in temporary facilities. "At each base visited, the RASS teams substantially reduced prevalent backlogs and restored order in the base supply functional areas" (5:III-1-117).

The second event which had a major impact on supply operations in Vietnam was the Air Force decision in late 1965 to implement the standard base supply system in Vietnam and to equip each of the base supply activities with the UNIVAC 1050-II computer. As mentioned previously, the substantial buildup of personnel and equipment beginning in 1965 and the change in operating concept within Vietnam from FOBs to MOBs caused a massive flow of supplies and support equipment into SEA. It soon became obvious the manual supply accounting system, in-being at the time, was not capable of handling the large influx of pushed supply items, because of the sheer quantity of items and the limited number of supply personnel in-country. The initial solution was to waive standard supply procedures in SEA in an effort to reduce accounting requirements and lessen the workload on the undermanned supply organization. However, the action only accentuated the loss of inventory control causing a rise in NORS rates and a decline in combat capability. Based on the rapidly deteriorating supply situation and recommendations of the

RASS teams, the Air Force decided in late 1965 to deploy UNIVAC 1050-II computers to Vietnam, beginning with Cam Ranh Bay Air Base in April 1966. By January, 1969, sixteen USAF bases in SEA were managing their supply accounts using the UNIVAC 1050-II computer (5:III-1-11).

A significant advantage of using UNIVAC computers was that it allowed bases in SEA and supply depots in the United States (which had installed UNIVAC 1050-II several years earlier) to speak the same supply language. This, in itself, was a marked improvement over the manual supply accounting system which experienced continual problems when attempting to interface manually generated supply requisitions against CONUS computerized supply accounts.

Conversion of supply accounts from a manual system to the UNIVAC 1050-II was not without its problems. Even in peacetime, converting to the 1050-II presented problems. During one conversion in the CONUS, base supply officers closed the supply accounts, except for high priority maintenance items, for 30 days. In the case of Tan Son Nhut the conversion to the UNIVAC 1050-II began on 15 October 1966 but the system did not become operational until 15 January 1967 (5:III-1-51). The irony of the conversion was that "as the USAF installed the UNIVAC 1050-II, SEA experienced a reduction in supply effectiveness for the year 1967" (4:256) due to the changeover process. As the 1050-II came on-line in SEA, there was a substantial improvement, with supply

effectiveness reaching 82 percent in 1968 and 84 percent in 1969. Comparative data for the period are listed below:

Table 1

Supply Effectiveness

<u>Year</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>
Demands	7,800	54,333	293,200	380,900	373,300
Issues	4,733	36,833	157,333	313,466	312,166
Supply Effectiveness (4:256)	61%	68%	54%	82%	84%

It should be noted that the UNIVAC 1050-II enabled a significant improvement in supply effectiveness in 1968 while managing nearly twice the number of item issues of a year earlier.

Another problem which delayed conversion to the 1050-II was that most of the materiel located in outside storage was not found on any supply records. In addition, many of the boxes containing supply items had deteriorated to the point that content identification markings were no longer legible. As a result, boxes had to be broken down to identify the contents before the items could be loaded into the computer and stored in suitable warehouses. However, with the assistance of the RASS teams, previously unrecorded supply items were processed and logged into the 1050-II. As indicated by the supply effectiveness figures, this resulted in a dramatic improvement in supply management and inventory control at the base level in Vietnam. Computerization of

supply accounts was credited for sharp decrease in NORS rates as indicated below:

Table 2
ANNUAL NORS RATES

<u>YEAR</u>	<u>% WORLDWIDE</u>	<u>% SEA</u>
1965 (July-Dec)	4.5	6.0
1966	5.1	6.3
1967	3.7	4.2
1968	3.0	3.0
1969 (Jan-July) (4:258)	3.2	2.4

It is interesting to note that by 1969 the NORS rate for SEA was actually lower than the worldwide USAF rate. Although the steady decline in the NORS rate cannot be attributed to any single factor, it is generally perceived that the transition from manual supply accounting to UNIVAC 1050-II computerized supply management procedures contributed substantially to that decline. This point was emphasized in lessons learned comments by the Joint Logistic Review Board (JLRB) which stated:

The ease of the standard base level supply system (1050-II computer) in the initial establishment of base supply stock record accounts in SEAsia would have significantly increased the effectiveness of supply support, reduced supply manning requirements, reduced inventories, and kept excesses to a minimum. Also, this system would have improved the total USAF management effort by providing information required at all echelons of supply management (10:I-0-6).

As bases in SEA made the transition to computerized supply management, and previously unrecorded supply items

were loaded into the computer, a new problem was identified - supply excesses.

The turbulence of compressed supply transactions, lack of adequate warehousing, and inadequate accounting generated excesses in 1965-1966. As supply accounts became automated and warehousing available, USAF supply personnel identified excesses amounting to \$473.9 million (10:I-1-58).

In 1967, the Air Force introduced two programs designed to redistribute, or return to active Air Force inventories, excess supplies and equipment in SEA. Project Commando RIPE (Redistribution of Idle Programmed Equipment) was an AFLC program aimed at identifying excess equipment resources at USAF bases in SEA. The program had four main objectives:

1. Redistribution of centrally procured excesses.
2. Reporting of base funded excess for internal PACAF redistribution.
3. Reconciling of depot and base equipment requisitions.
4. Accepting excess turn-ins from using organizations (5:III-1-76).

Under the program, RIPE teams, made up of Air Force equipment and transportation specialists, traveled among bases in SEA, supplementing base RIPE teams in a joint effort to achieve the stated objectives (10:I-1-58). Consisting of three phases, the program covered the period from 20 October 1967 through 29 July 1968. During that time, PACAF reported 130,160 excess items valued at over \$40 million (5:III-1-77).

In December, 1967, a second program, code named Project Commando EASY (Excess Assets Stock Yield) was implemented in

SEA. A joint project of the USAF, the AFLC, and the PACAF, Commando Easy was created to identify, pack, crate, and redistribute excess spares, supplies, and equipment to requesting bases within SEA, or if no requirement existed, to appropriate air materiel areas in the CONUS (5:III-1-77).

In addition to RIPE and EASY, USAF initiated a number of major programs during FY 1968 to identify and use or dispose of excesses. Overall, the programs were generally considered successful in redistributing unneeded supplies and equipment and reducing the number of line items in SEA supply accounts. However, the solution to the problem of excesses in Vietnam was not identification and redistribution. Avoidance of excesses through effective inventory management (including the use of computer resources) and provision of suitable storage facilities for supplies and equipment would have contributed substantially to avoiding supply excesses in Vietnam.

IV. Air Force Supply Structure and Supply Sub-Systems

This chapter examines the two major components of the USAF supply structure, wholesale supply and base supply, as they directly related to logistic support of the Vietnam War. Within that structure the sub-supply elements of services, POL, and munitions were also analyzed in terms of effectiveness of operational problem encountered in Vietnam. And, finally, the effectiveness of the common supply system, in which the Army and Navy supplied common items to authorized users in Vietnam, is discussed.

Wholesale Supply versus Base Supply

The logistics support of USAF personnel and equipment in Vietnam, beginning with the force buildup in 1965, presented a major challenge to logistics planners and placed a heavy burden on the logistics infrastructure which existed at the time. Much of the credit for successfully meeting the Air Force logistics challenges of the Vietnam War has been attributed to the ability of its logistics planners to tailor the logistics structure to satisfy operational requirements. At the heart of the USAF logistics structure was the United States Air Force supply distribution system.

The Air Force's internal supply distribution system consisted essentially of two echelons: a "wholesale" level which was comprised of the Air Force Logistics Command (AFLC) and the five Air Materiel Areas (AMAs), and a "retail" level,

comprised of base supply activities, which provided supply support at U.S. bases in the CONUS and overseas (see Figure 6). Further, the world-wide supply support of the Defense Supply Agency (DSA) and the General Services Administration (GSA) formed an element of the wholesale level.

Wholesale Supply

The AFLC was primarily responsible for providing supply support policies, procedures, and technical supervision for all supply activities in the Air Force in accordance with Air Force Manual 67-1 (5:III-1-151). In addition, the AFLC, and the DSA and the GSA represented the three primary wholesale suppliers to USAF base supply organizations worldwide. In this role, the AFLC was responsible for determining supply requirements and procuring, storing, and distributing supply items and spares associated with USAF weapon systems. "AFLC support encompassed a variety of management processes, including the identification and classification of support items, the computation of buy and repair requirements, preparing and defending budgets, performing or contracting for depot overhaul or modification, and directing disposition of base excesses" (10:I-1-45). Thus, the AFLC provided centralized control of the logistic supply support function for the entire United States Air Force. In more simple terms, the AFLC strove to insure the highest level of Air Force combat capability by providing the right part, to the right place, in the right quantity, at the right time.

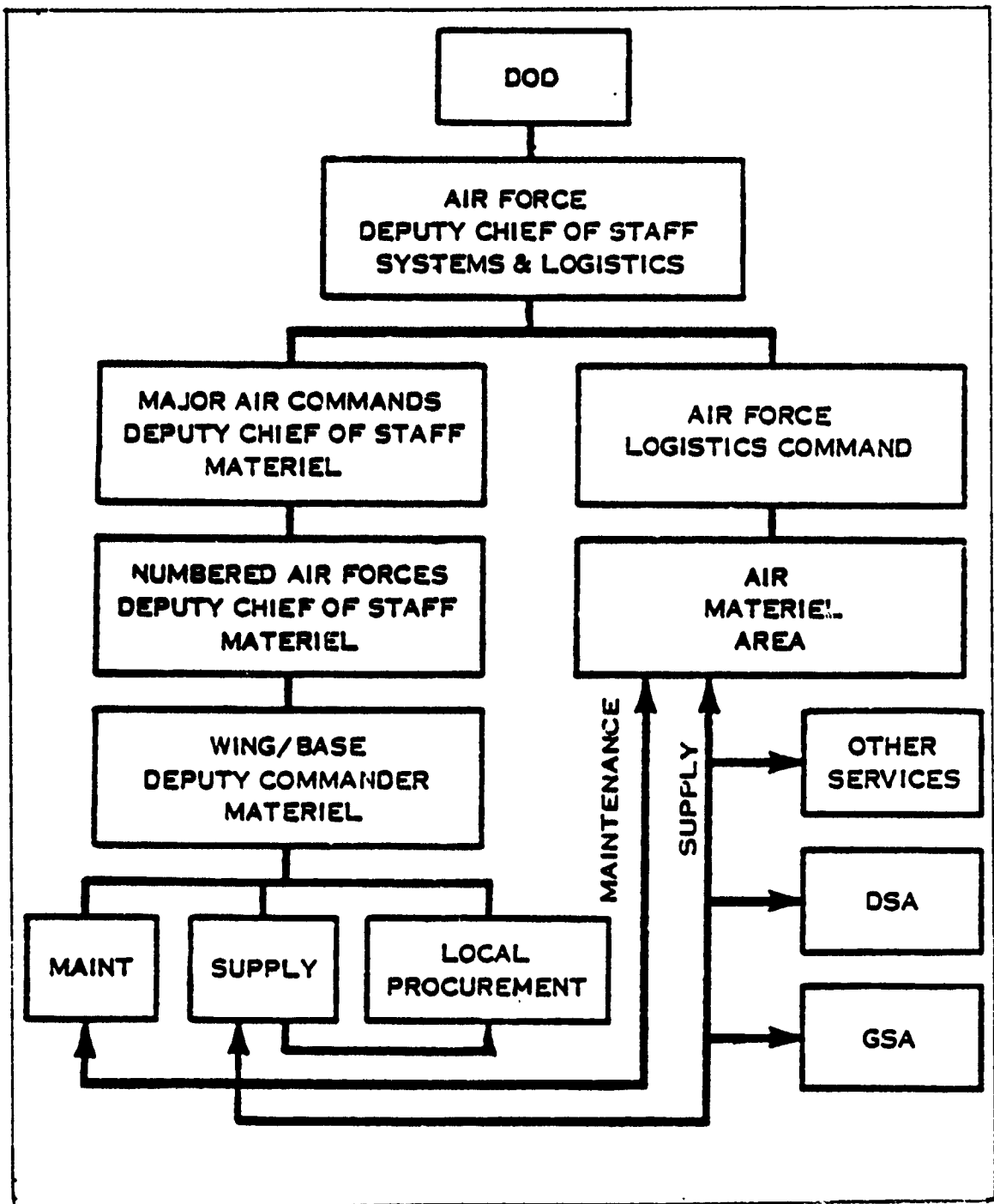


Figure 5. A.F. Distribution System (19:114))

During the Vietnam War, the AFLC was tasked to support USAF base supply requirements worldwide while simultaneously satisfying the tremendous supply demands generated by the war in SEA. This equated to providing worldwide support for approximately 18,400 aircraft (60 percent of which were more than nine years old); 9.2 million USAF and allied flying hours per year; 73,000 aircraft engines; 7,254 missiles, 84,000 separate line items of equipment and a multitude of avionics, fire control, and bomb-navigation subsystems (5:III-1-104). This effort was complicated by the reactivation of old, outdated weapon systems (such as the A-1E and B-26) which increased inventory management requirements. For example "On 1 January 1965, USAF was the recorded user of 1,628,516 items, and on 30 June 1969, the total was 1,775,824, an increase of 147,308, in five years" (12:x). The fact that the increase in line items was only 9 percent was a result of aggressive AFLC management control. During that time AFLC was able to reduce the number of line items under its control by 203,465, because it transferred managerial control for those items to DSA and GSA (5:III-1-103).

A major change within the logistics community during this period was the conversion from a logistics support system geared principally for the massive retaliation, or decisive blow, strategy dominant in the fifties and early sixties to one which included a strong conventional response (12:xvi). The type of conflict which unfolded in SEA further

supported that conceptual change. The net result was that logistics planners at the AFLC were faced with developing an effective logistics support system capable of supporting world-wide conventional forces while striving to satisfy ever-increasing supply requirements in Vietnam.

As our rapidly expanding force structure in Vietnam placed greater demand on all levels of the logistics infrastructure, the AFLC responded. The AFLC's development and implementation of logistics support programs designed to enhance our combat capability in Vietnam were unprecedented. Push resupply programs, such as Projects Bitterwine and Gray Eagle, previously discussed, provided initial support to our forces in SEA. When the problem of supply excesses was identified, the AFLC introduced Commando Ripe and Commando Easy, along with the necessary manpower, to rectify the problem. The development of rapid area supply support (RASS), rapid area maintenance (RAM) teams, and rapid area transportation support (RATS) teams were all initiatives of the AFLC to assist units in Vietnam or elsewhere in the world. These teams "were set up and organized so that they were able to go anywhere at any time, without a lot of advanced preparation" (20:95). The effectiveness of these teams was exemplified in a letter to AFLC in late 1966 by Lieutenant General William W. Momyer, Commander, Seventh Air Force (PACAF), regarding RAM team actions for aircraft damaged in an enemy attack on Tan Son Nhut Air Base:

Your people did a terrific job following the attack on Tan Son Nhut. As you know, we had some fifteen aircraft damaged to some degree. Except for two CH-3 helicopters and an RF-4C, every one of these damaged aircraft was back in the air in less than a week. Parts held up the chopper and RF-4C or they would have been in the air also. Your people worked around the clock, and I am very appreciative of the way they have played on the combat team. (quoted from 18:5).

Another very highly successful and dynamic program implemented by AFLC was Operation TURNKEY, in which the AFLC, working through the AMA at Sacramento, supplied all the base support materiel necessary to build and make ready the airbase at Tuy Hoa, Vietnam. The one-ship unit move of 4 million pounds of materiel sailed from the Sacramento Water Port in September of 1966 and arrived in Vietnam in October 1966 (4:137).

Project PACER OAR was established by the AFLC to replace approximately 10,000 line items of critical communications and electronic equipment lost when enemy action destroyed a warehouse at Da Nang (12:xxvii). It was yet another successful effort of the AFLC to support forces in Vietnam to the fullest.

Each of these programs and operations reflected the innovative and responsive character of the AFLC as it provided the logistic support necessary in SEA during times of peak workload or as combat requirements dictated. The AFLC's supportive actions improved the logistics posture in Vietnam with the resultant effect of enhancing U.S. combat capability.

The AFLC's supply responsibilities were decentralized in the five AMA's located in the CONUS. They were located at Sacramento, California (SMAMA); Ogden, Utah (OOAMA); Oklahoma City, Oklahoma (OCAMA); San Antonio, Texas (SAAMA); and Warner-Robins, Georgia (WRAMA). "The five air materiel areas performed the traditional worldwide distribution functions in addition to having responsibilities for inventory control, purchase, and disposal of stocks" (21:91). The AMAs, along with DSA and GSA, provided the full range of backup stock required by USAF bases to support combat operations.

The AMAs also acted as the major repair depots for the overhaul of complete aircraft, aircraft engines, and related aircraft components beyond the maintenance capability of the home base repair facilities.

During the Vietnam War, each of the AMAs became directly involved in the implementation of the AFLC logistics support programs. For example, the concept of RASS teams, used in-country to help reduce supply bottlenecks, originated in the Headquarters. However, the composition of the teams consisted primarily of civilian volunteers from the various AMAs. The same was true for all other AFLC programs supporting operations in Vietnam. The Sacramento Air Materiel Area (SMAMA) maintained responsibility for a number of AFLC sponsored programs supporting USAF operations in Vietnam. For example, SMAMA was primarily in charge of procuring (from other AMAs or commercial sources) and

assembling the various components for Project Bitterwine packages and arranging transportation to SEA.

The DSA and GSA each had specific commodity responsibility for providing timely and adequate logistics support to the U.S. military forces. This concept of integrated materiel support, tested under combat conditions for the first time in SEA, did experience some difficulties, especially in the early days of the force buildup (5:III-1-154).

The DSA, established in August, 1961, provided direct logistics support to the Air Force worldwide. During the Vietnam buildup period, beginning in July 1965, DSA item responsibility increased from 1,305,000 items to a total of 1,964,000 items by the end of the decade - a 50 percent increase. A portion of the increase was due to the transfer of AFLC responsibility for a number of line items in its inventory. And, by the end of June 1969, DSA was managing approximately 48 percent of the 4.1 million items used by the military services (22:4). Because DSA had no supply activities outside the CONUS (ie - they had no control over transportation or port handling) supply effectiveness was based on the availability of requisitioned items at the CONUS DSA supply location. In the case of the Air Force, DSA supplied requisitioned items to the Air Force AMAs, which, in turn, handled the distribution of DSA-procured items to USAF bases throughout the world (22:49 and (5:III-1-132).

During the initial period of the force buildup in Vietnam, DSA inventories dropped to critical levels due to the enormous demand surge that developed. "At the beginning of the Vietnam War on 1 January 1965, DSA filled 91.5 percent of customer demands at the time of receipt by the center. Supply availability steadily dropped, reaching a low point of 82.7 percent in October 1966 (5:III-1-134). This resulted in reduced logistic responsiveness and, in some cases, persistent supply shortages which remained until fiscal year (FY) 1967. The essential reasons for the critical supply shortages of DSA managed items were fourfold:

1. Program and planning data furnished to DSA by the JCS and the military services were neither adequate nor timely.
2. Peacetime stocks were not adequate to meet the initial demand surge.
3. Mobilization reserve stocks were inadequate; for thousands of items selected for mobilization reserve stockage, there was no mobilization reserve stock at all.
4. The production base and production expansion capability proved inadequate to meet the initial demand surge (5:III-1-137).

Despite the shortages, DSA maintained a favorable image as a supplier among the service branches (5:III-1-136).

The GSA was responsible for the management of Government property and records, procurement and distribution of supplies, disposal of surplus, and the stockpiling of strategic and critical materials (5:III-1-149). Although established in 1949 by the Federal Property and Administrative Act of 1949, GSA did not begin providing

significant supply support to the U.S. military until 1963. By 1970, GSA was managing over 68,000 military supply items (10:I-1-44). The majority of these were of a housekeeping or station keeping nature and were not mission, weapon system, or combat supplies.

GSA supply effectiveness in Vietnam was not regularly reported. Supply officers used a "management by exception" reporting process in which only supply problem areas were reported. Problem areas received concentrated management attention until resolved. Based on available data, GSA "on-time" fill rates (percent of supply requests satisfied by GSA) throughout the Vietnam War remained at acceptable levels. Overall, GSA supply availability never went below 84 percent (22:81). In fact, the feeling among USAF supply personnel in Vietnam was that GSA support was excellent (5:III-1-150).

Base Supply

As mentioned previously, the Air Force supply distribution system consists of two echelons: the wholesale level, sometimes referred to as the second echelon of supply support, and the retail level or base supply, generally considered to represent the first echelon of supply support. It is this first echelon, made up of Air Force base supply organizations located throughout the CONUS and free world, which provides the supply support necessary to maintain USAF weapon systems and forces in a high state of combat readiness.

"The retail supply element of the Air Force is centered as a single supply activity under the chief of supply at base level, and is managed by the base supply officer" (21:92). In this capacity, the base supply officer requisitions from depot, stocks and receives, stores, and issues supplies as needed to support combat operations. In addition, base supply provides housekeeping, repair and maintenance support, operational clothing requirements, and a myriad of other support services. As the original point of demand, base supply is the point where supplies are issued for consumption or, in the case of equipment, for end use (21:93). In this role, base supply is the critical link between the wholesale supply function (AMAs and DSA and GSA) and the supply customer or end user.

During the Vietnam War, USAF base supply organizations in SEA encountered a multitude of problems which impacted the logistic support of Air Force combat capability - especially NORS rate of combat aircraft. Four major factors which degraded supply item availability were:

1. The inadequate logistics bases and facilities in Vietnam to receive and distribute materiel.
2. The difficulty in accurately predicting combat supply requirements (since no basis existed for those statistics).
3. The delay in changing supply accounts in SEA from a peacetime priority requirement to a wartime priority requirement (due to the fact that war had not been declared and a state of emergency was not in effect).
4. And the unwillingness of industry to respond to procurement requests for military requirements over their civilian oriented manufacturing (4:140).

The combination of these four factors, plus a tremendous increase in customer demands as a result of the commitment of USAF forces to Vietnam beginning in 1965, caused a downward trend in supply availability beginning in FY 66 (5:III-1-33).

In terms of base supply personnel in SEA, there existed shortfalls in both quantity and quality, especially in the initial stages. Inadequate manning levels was a consequence of politically established in-country force levels. Because the initial emphasis was on deployment of combat forces, logistic support personnel were not deployed until after the introduction of the combat forces. In addition, the PACAF based SEA supply manning levels on CONUS standards applicable to bases which purchased many items of supply on the open market. The inability to purchase items on the open market, plus the need to stock SEA peculiar items (ie. generators, water purification material, runway matting, etc.) resulted in a far larger inventory and thus the requirement for increased manpower. And, finally, the lack of automated equipment (until the installation of the UNIVAC 1050-II) to manage the mountains of supply items being pushed into SEA under programs such as Bitterwine and Gray Eagle, created a tremendous burden on the undermanned supply organizations (5:II-1-81).

Supply effectiveness was also degraded by a decision in 1965, by the Air Training Command, to train all supply personnel in computerized (UNIVAC 1050-II) supply

procedures. Since supply accounts in Vietnam at the time were managed using either manual procedures or the punch card accounting machine (PCAM) system, supply personnel arriving in SEA required retraining in those systems (10:I-1-53). That retraining caused the effective loss of a portion of the person's tour of duty in SEA. And the decision not to call up Reserve forces effectively eliminated that source of trained personnel. That decision also indicated that contingency planning by the Services for future conflicts should provide manpower alternatives which do not include the Reserve forces (23:80).

All of the above factors, plus those discussed in Chapter II (ie. inadequate storage facilities, lack of supply computer capability, poor inventory control), combined to produce an abnormal workload as viewed from a peacetime stable base situation (III-1-80).

As USAF equipment and personnel supply requirements stabilized within SEA, base supply effectiveness steadily increased. A measure of improved supply effectiveness was the continual decline in NORS rate from 1965 through 1969 with a low of 2.4 percent in the first half of 1969 (4:I-1-55).

Services

Services, as described in this section, includes the following logistics support provided combat troops in SEA:

1. subsistence support
2. exchange services

3. uniform clothing support

4. recreational services

Although this list does not include all services provided US combat forces in Vietnam, it does comprise the principle ones.

Services provided to U.S. forces during the Vietnam War were excellent compared to services provided our forces in previous conflicts. Although of limited availability at the onset of increased force deployment to SEA in 1965, quality of life and morale-oriented services soon became available. Brigadier General Ernest L. Ramme, in the spring of 1966, stated:

The morale of troops working long hours, living in substandard quarters and far from home is a vital consideration. The ability of airmen to obtain items which are essential to living, make the rugged life of combat more endurable, and an opportunity for relaxation were lacking during the early phases of the effort in Vietnam. Immediate action was taken to make Base Exchange facilities and motion pictures available to all airmen in Vietnam (14:159).

Subsistence Support

One of the more critical elements of any combat operation is quality food service. The often quoted remark that "an army marches on its stomach" was as relevant to the Vietnam soldier, sailor, and airman as ever before. Initial food service operations in SEA used field equipment from Gray Eagle kits (5:III-1-208). Designed for temporary bare base operations, these kits were not intended for more permanent messing operations. Problems such as inadequate

refrigeration, improper facility set-up, and the lack of trained food service personnel, resulted in poor quality food service. Meals during this phase were either A or B rations. The A rations consisted of fresh and frozen meats, fruits, milk, and vegetables requiring refrigeration. The B ration consisted of canned or dry storage items and did not require refrigeration (5:III-1-208 and 11:227). Because of the shortage of refrigeration units prior to October 1967, most Air Force troops "dined" on B rations. Conditions changed for the better in October 1967, when the Sea Land Corporation began delivery of refrigerated vans to South Vietnam. Beginning on that date four ships arrived every fifteen days with 120 refrigerated vans and 530 dry cargo vans aboard. The delivery of the refrigerated vans was divided with 60 going to Saigon and 30 each going to Qui Nhon and Cam Ranh Bay respectively (11:227).

To provide sufficient food service for the continuing force buildup, commanders modified and/or expanded existing field kitchens. For example, where power sources were available, permanent equipment was installed in temporary field kitchens in an effort to provide better food service support to a greater number of personnel (5:III-1-209). Officers and enlisted men's clubs were also converted to accommodate field ration operations. Eventually, more permanent messing facilities were constructed and "nearly all bases in SEA were able to provide adequate and, in most cases, first class food operations in permanent facilities

for authorized personnel" (5:III-1-209). As refrigeration came available, the procurement of fresh meats, fruits, and vegetables became more prevalent. To supply fresh milk and ice cream to deployed forces, American style dairies were established in Vietnam. "Smaller ice cream plants (40 of them, in total) were brought into the country to provide ice cream as far forward as possible (11:227).

The Army was the primary source for subsistence for all service branches in SEA (common subsistence support), with the Navy providing limited support to some bases. To augment this source, the 7th Air Force maintained on-hand emergency levels of A and B rations.

Initially, food items were stored in messing facilities. This procedure made accountability difficult due to poor record keeping and unauthorized uses of foodstuff. To correct these problems, and to provide more secure storage, most bases established central storage facilities which possessed refrigeration capability (5:III-1-209).

In addition to having dairy products available in Vietnam, U.S. forces also enjoyed fresh produce bought locally or flown in from the CONUS. Fresh bread was purchased locally or, as permanent dining halls were completed, baked daily in base facilities.

As the war in SEA progressed, semi-permanent facilities with modern messing equipment were constructed which greatly improved the quality of food service in Vietnam. "By June

1968, the operating effectiveness of bases throughout SEA was generally comparable to those in CONUS" (5:III-1-209).

Exchange Services

Exchange service was provided to Air Force personnel in Vietnam through the Pacific Army and Air Force Exchange System (PACEX) after December 1965. Prior to that date the Navy exchange system provided exchange support in Vietnam. The purpose of exchanges in Vietnam was to provide items of necessity and convenience and to generate funds for support of morale and welfare (5:III-1-211). The effectiveness of the exchange system in SEA was degraded in the initial stages of the Vietnam War by three factors:

1. The lack of experienced, full time civilian employees which necessitated the use of enlisted personnel for exchange duties and officers for management activities.
2. Inadequate exchange facilities due to low priority for assignment of facilities on bases. This resulted in loss of exchange items through theft and exposure to the elements.
3. Low transportation priority which this caused large backlogs of exchange items at CONUS and overseas ports and frequent out-of-stock conditions at exchanges in SEA (5:III-1-211).

Despite the problems described, exchange sales projected a different picture. In a one year period from January 1966 to January 1967 sales in SEA amounted to \$156 million. In just the next seven months sales nearly equalled that amount. However, a significant portion of those figures involved catalog sales (since items desired were not in stock) and luxury items such as diamonds, gold, and stereo

equipment. This was contrasted by "frequent out-of-stock conditions at exchange outlets of essential items such as razor blades, shoe laces, shoe polish, cigarettes, soap powder, and film" (5:III-1-213) which continued through 1966.

Uniform Clothing Support

USAF uniform clothing support was provided through clothing sales stores. Depletion of stocks caused by the initial force buildup and the shortage of qualified clothing sales personnel hampered early operations. Stock-outs were caused by climatic conditions in SEA which caused rapid deterioration of uniform items and necessitated more frequent replacement. Consequently, the Air Force increased the uniform clothing allowance to permit more frequent replacement of uniform items and sponsored development of more suitable clothing and footwear (14:159). By June 1967 "stocks of the 17 clothing sales stores in SEA provided adequate support and generated sales of \$90,000 monthly" (5:III-1-216).

Recreational Services

Recreational facilities on major bases in SEA included Olympic size swimming pools, fine gymnasiums, lighted ball diamonds and tennis courts, and a number of other amenities. Although these services contributed to higher troop morale in Vietnam, their construction and maintenance placed an increased burden on the already overburdened logistics system in-being (11:230).

Petroleum, Oil, and Lubricants (POL)

The supply of POL products to U.S. forces in SEA proved to be a complicated logistic effort requiring the coordinated efforts of each of the service branches to insure adequate fuel to support combat operations. This task was made more difficult by the lack of adequate facilities to receive, store, and distribute bulk fuels and by the long lines of supply to SEA. The methods employed, although sometimes costly, effectively provided essential POL resources throughout the Vietnam conflict. In fact, "when asked to list logistics problem areas during their tour of duty in Vietnam, field commanders did not include POL" (5:III-1-169).

Prior to the buildup of U.S. forces in Vietnam, starting in 1965, the U.S. had little in-country POL logistic support capability. "Coastal, inland waterway, and overland transportation of bulk products, drummed fuels, packaged lubricants, greases, and into-plane services were all provided by commercial suppliers" (24:30). At the time it was more economical to obtain POL support from the three major oil companies - Esso, Shell, and Caltex - since those companies could satisfy military requirements at the time (25:41). The main source for this supply was at Nha Be, located 9 miles south of Saigon, which possessed approximately 80 percent of the in-country POL. Another 12 percent was stored at Da Nang, while the remaining 8 percent was located at various other locations in Vietnam. A major limitation of these commercial sources of POL was their

inability to receive fully loaded fuel tankers. Although most storage facilities were located on inter-coastal waterways, draft depths of 27 feet or less meant fuel delivery had to be made by shallow-water tankers or partially loaded T-2 tankers.

By mid-1965 it was recognized that the POL system in-country would not be able to support the fuel requirements of rapidly expanding military operations in Vietnam. To augment the commercial source, the Army, Navy, and Marine Corp used 10,000 gallon collapsible tanks with 4 inch rubber hoses, and 350 gallon per minute pumps to store and dispense fuels. These tanks were filled by off-shore tankers using ship-to-shore pipelines. In addition, "500 gallon air-transportable collapsible drums, amphibious assault fuel systems (Marine), and the Army's 60,000 gallon Fuel System Supply Point (FSSP) equipment provided supplemental storage capability" (26:9). Small tankers (called AOGs) were also used to transport fuel in-country to locations not accessible to larger tankers. The Air Force used a portable hydrant fuel system, consisting of four 50,000 gallon collapsible tanks, capable of servicing two aircraft simultaneously at a 300 gallon per minute rate. As operations increased, 25 of these systems were deployed to Vietnam to handle aircraft refueling (24:42).

In July 1965, the Commander in Chief, Pacific (CINCPAC) assigned common responsibility for in-country POL support to the Army and Navy. The objective was to increase overall

effectiveness and economy. The Army was given POL responsibility for the II, III, and IV Corps Tactical Zone (CTZ) while the Navy was assigned POL responsibility for the I CTZ (see figure 6). The Air Force was assigned on-base POL support at USAF bases in SEA. "A major portion of the fuels used by the Air Force at fixed installations was delivered from marine terminals by Army and Navy inland distribution systems using available pipelines, tank trucks, rail cars, barges, and collapsible tanks" (24:21). The Air Force POL storage policy in SEA required an on-base storage capacity of 30 days of anticipated usage plus 30 days additional supply in the commercial and/or military storage complex supporting the base (24:44). Although not assigned a geographical area of POL responsibility, USAF airlift forces did support U.S. and allied forces at bare base locations with air transportable fuel dispensing systems, aerial bulk-fuel delivering systems, rubber fuel storage tanks, 55 gallon drums, and various other collapsible fuel tanks. As stated by Lt. General A. T. McNamara: "The 55 gallon drum still remains one of the tactician's best friends, along with the C-123, C-130, and CV-2" (25:43).

The Plei Me operation in 1965, typifies the POL support provided by airlift forces. During a ten day period, 700,000 gallons of JP/4 fuel was airlifted in 500 gallon collapsible drums, requiring 156 C-130 sorties. (The C-130 "Flying Tanker" was capable of delivering 4,000 gallons of fuel per sortie) (25:43).

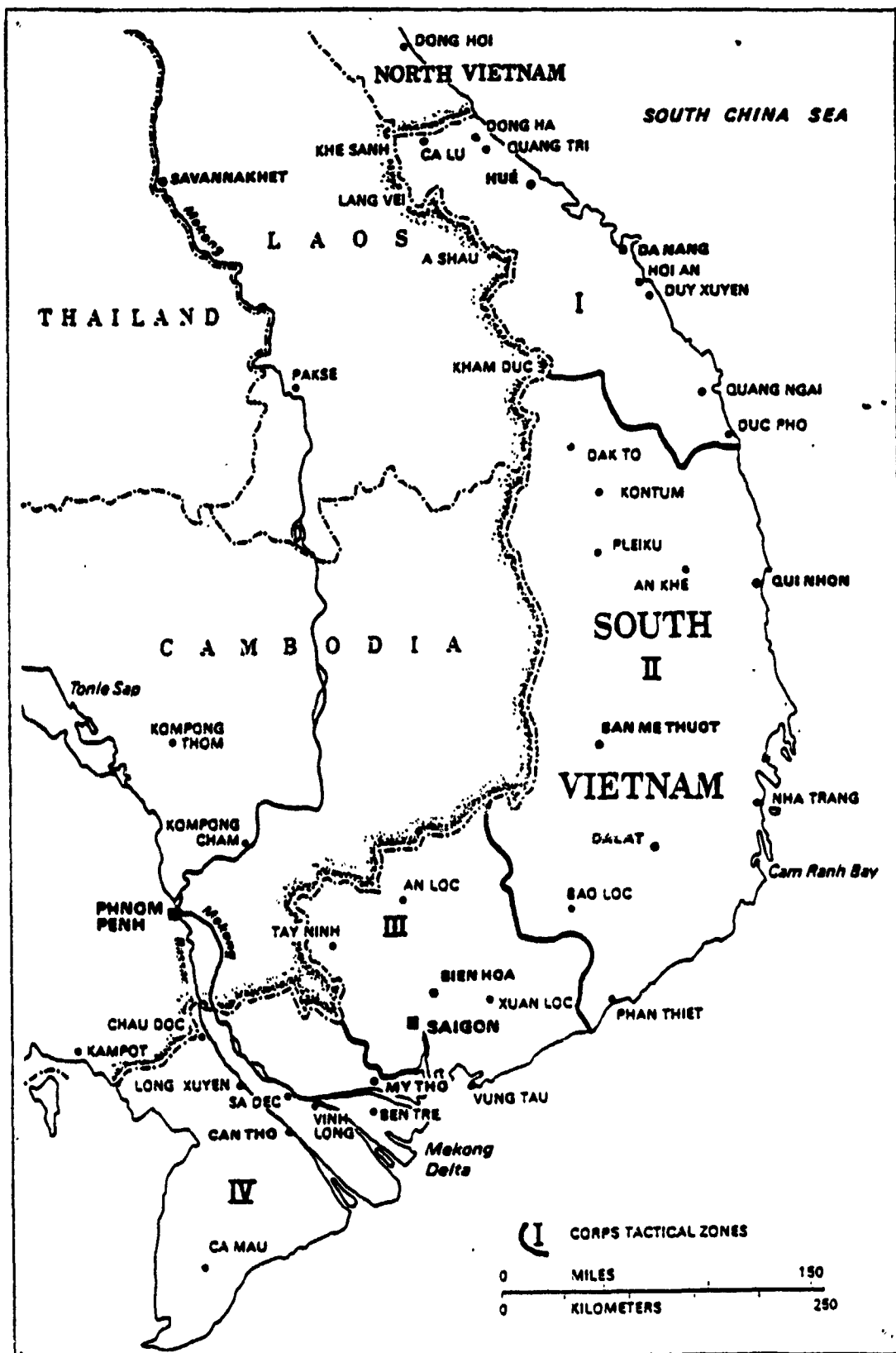


Figure 6. Corp Tactical Zones (7:103)

Marginal POL storage facilities in SEA remained a problem through most of the Vietnam War. As mentioned earlier, a number of different (mostly temporary) methods were employed to store POL products including off shore tankers (floating storage), rubber bladders of various shapes and sizes, and any other container which could store fuel. Attempts, during the early phases of the conflict, to construct more permanent POL storage facilities met with little success because of the cost involved and the feeling among key political and military people that the war would be of short duration. As a result, "the overall costs of providing petroleum products were far higher than would have been necessary if an early decision had been made to construct sufficient steel military storage tanks for the economic utilization of tankers" (24:139).

Fuel requirements for SEA, especially aviation fuel, placed significant demands on the POL supply network. This was, to a large extent, due to the use of high-performance aircraft within SEA by the Navy, Marines, and Air Force and the extensive use of Air Force airlift (C-130, C-123's, etc) and Army helicopters to resupply combat forces in-country. Yet, despite poor storage facilities and a long POL pipeline, petroleum supply to combat forces must be viewed a successful operation in Vietnam. As stated in the Joint Logistic Review Board (JLRB) report on logistic support in the Vietnam era (Vol II) "POL support of Air Force units and operations was

effective and no combat operations were curtailed because of a shortage of POL" (19:261).

Air Munitions

Expenditure of air munitions by the United States Air Force during the Vietnam War reached unprecedented, and, more importantly, unplanned for, levels.

During the first year of major combat operations in Vietnam, the Air Force flew more sorties and dropped more air munitions than in any single year of the Korean War. In 1965, 148,751 tons of munitions were expended compared to a peak expenditure of 146,163 tons against communist forces in Korea in FY 53. And by the end of November 1969, the Air Force had expended 28.7 percent more air munitions in SEA than the combined Air Force expenditure during World War II (both theaters) and the Korean War. (19:258).

Yet, on 1 January 1965 it appeared the Air Force was well prepared, in terms of air munitions, to fight a conventional war such as the one shaping up in Vietnam. Existing war plans tasked the Air Force to support 180 days of non-nuclear combat (90 days with modern air munitions plus 90 days using older ordnance). At the time, due to the tremendous amount of air munitions left from the Korean War, gross tonnage on-hand was in excess of three times the total required by the Secretary of Defense Logistics Guidance objectives (27:34).

Although appearing to reflect a solid combat posture, the reality of the air munitions situation revealed a different situation. Most of the air munitions in storage were general purpose bombs of Korean War vintage, compatible with older type aircraft such as the A-1E and B-57. Critical

shortages of more modern streamlined ordnance designed for external carriage on high speed jet aircraft resulted in the cancellations of programmed jet sorties and reduced bomb loads on sorties flown. For example, between 4-7 April 1966 some 233 strike sorties had been cancelled or dropped from schedules, and the effectiveness of strike sorties actually flown was reduced, because of less than optimum loadings for the targets assigned due to munitions supply problems. On 8 April the Commander, U.S. Military Assistance Command, Vietnam (COMUSMACV) informed the CINCPAC and the Joint Chiefs of Staff he considered air munition shortages an emergency situation seriously affecting air strike capability in SEA (27:51).

Shortages of air munitions in SEA were a consequence of a number of factors. As stated, the air munitions tonnage available at the start of 1965 was three times the non-nuclear tonnage required by existing war plans. Those wartime computations, however, were based on peacetime usage and the planners had vastly underestimated and underfunded the actual air munition requirements. "For example, in December 1968, the Air Force expended 10 times the tonnage of air munitions stated as the monthly requirement in 1965" (27:34). A significant increase in monthly air munition usage occurred when President Johnson directed the use of B-52s in conventional bombing raids over North Vietnam. By mid 1965 300 B-52 sorties were being flown each month. Just six months later that figure increased to 400 sorties per month.

By the end of 1966 the CINCPAC and the Joint Chiefs of Staff recommended an increase to 800 B-52 sorties per month. However, air munitions on hand would only support 450 sorties per month (27:48 and 52). Based on an average bomb load of "27 tons per sortie," (19:258) that equated to a usage rate of 12,150 tons of ordnance per month just for B-52s. Surge requirements for air munitions, such as the air offensive against North Vietnam in mid-February 1965 (code named Rolling Thunder), also caused the rapid depletion of existing stocks.

The problem of too few bombs was accentuated by the fact that in the Spring of 1966 approximately one-third of the total tonnage of air munitions in SEA was comprised of incomplete rounds (ie. bombs without fin assemblies, tail fins, or fuses; rockets without warheads; etc). This was a result of transporting various components of air munitions in different shipments. To correct the problem, the PACAF, in September 1965, directed the AFLC to insure future shipments of munitions be in complete rounds (including fins, fuses, etc) unless directed otherwise. This idea of putting complete bombs on shipments to Vietnam came to be known as CRAMSHIP and proved a very effective method of moving air munitions to SEA (27:132).

In February 1966, the CINCPAC requested that existing air munitions requirements in SEA be matched with in-country bomb availability to determine shortfalls. The appraisal revealed a deficit of 563,000 bombs. The shortage of bombs

plus the lack of component bomb parts in SEA caused Air Force air munitions expenditures in sortie rates to drop significantly in April 1966 (27:51).

A number of actions were initiated to procure more bombs for the war effort in SEA. The redistribution of air munitions from War Reserve Materiel (WRM) storage around the world was directed as well as the repurchase of 18,000 bombs previously provided U.S. allies under the Military Assistance Program (19:258). In addition, a Munitions Directorate in the Office of the Secretary of Defense was established in April 1966 to manage air munitions logistics, to promote the immediate acceleration of munition production, and to activate the automatic "push" of munitions to SEA (27:53). For example, the Munitions Directorate was responsible "for accelerating production of 250 and 500 pound bombs to increase deliveries between April and December 1966 by some 50,600 tons over contract schedules" (27:53).

An excessively long pipeline and an inefficient distribution system represented other major problems supplying air munitions to SEA. Under the procedures established in the initial stages of the war, most air munitions intended for combat operations in SEA were first shipped to the naval installation at Subic Bay in the Philippines. From there, they were trucked to Clark Air Force Base and stored until requested by USAF forces in SEA. Upon request, the munitions were trucked back to Subic Bay and re-loaded into ships bound for Vietnam. Upon arrival in

Vietnam, the munitions were transferred to shallow water barges which moved the ordnance to docks where it was again transferred to trucks for movement in-country. The entire process took an incredible 270 days (27:24).

The inefficient method of supplying air munitions to SEA led to a direct CONUS-to-user system called Project Special Express which bypassed Clark Air Base. Under the program, the Military Sea Transportation Service (MSTS) dedicated five ships for the exclusive use of the Air Force for the purpose of moving air munitions. As the expenditure of munitions in Vietnam increased the number of ships was also increased, reaching a total of 19 in June 1966 (19:288). In-transit times for these ships was 30 days, which substantially reduced the pipeline for air munitions. After arriving in SEA the ships were used as floating munitions warehouses, providing daily "as required" delivery to meet tactical commitments (14:30). The use of ships as floating munitions storage facilities was possible only because U.S. forces retained air and sea superiority throughout the war and the ships were never threatened by Viet Cong or North Vietnam forces. In January 1967 the Air Force, having reached air munition stockage objectives, returned the ships to MSTS control. By that time Special Express had transported approximately 750,000 tons of air munitions to SEA (27:133). Another munitions related deficiency which adversely affected the combat effectiveness of Air Force units was the lack of qualified munitions personnel skilled in non-nuclear

weapons handling. There were few munitions officers trained and experienced in conventional air munitions handling. Enlisted munitions maintenance personnel were available only in numbers adequate for peacetime operations. A primary reason for this lack of preparedness was the Air Force's reliance upon the Army and Navy for ammunition production and CONUS storage - a service, which for the most part, was not provided in SEA. As a result, the Air Force was required to learn weapon system handling procedures by "on-the-job training". In May 1965 an Ammunition Control Point (ACP) was established at Tan Son Nhut Air Base near Saigon. A warrant officer and five airmen composed the initial cadre, and they "wrote the book as they went along" (27:48). Besides having little experience, this group had to cope with incompatibility between munitions loads and modern aircraft, and with ever-expanding air munition requirements.

By August 1966 munitions production surpassed consumption for the first time. This, along with resolution of the incomplete rounds problem, allowed component commanders to revert to a "pull" distribution of many munitions types. By February 1967, the air munitions crisis was over although shortages of some desired types of munitions continued (27:55).

Common Supply

The concept of employing a single supply system to provide common use items to all service branches was employed

on a limited basis in Vietnam. The idea was to gain efficiency while maintaining effective supply response. This philosophy is conveyed in a memorandum on "Common Supply" from the Office of the Secretary of Defense dated 28 April 1969:

We regard common supply systems in a positive sense on the basis that if one system can perform a common task satisfactorily for two or more Defense components, it will, if managed effectively, be able to perform the task more economically than two systems operating dual pipelines (quoted from 28:3).

At the time, the Department of Defense considered it more economical to employ a common supply system to satisfy all military activities in the same geographical area and believed the conflict in Vietnam offered a good opportunity to test that theory.

Prior to the buildup of U.S. forces in Vietnam, the administrative and logistics support to military advisors was provided by the Navy. This included subsistence support along with administrative and housekeeping requirements. During that time the Navy compiled a list of approximately 3,500 common use line items which later became the basis for common use items supplied by the Army and Navy (28:8).

With the buildup of forces in Vietnam came an increase in demand on all areas of supply including common use items. To lessen the burden on the Navy, the Office of the Secretary of Defense, in May 1966, transferred responsibility for supply of common use items in the II, III, and IV Corps Tactical Zone (CTZ) to the Army, while the Navy supported common use item supply responsibility in the I CTZ

(5:III-1-291) (see Figure 3). During this same period a plan was developed, based on recommendations by the Joint Chiefs of Staff, which would place responsibility for support of all common supply items in SEA under the control of the Army.

The plan was never implemented for the following reasons:

1. Concern over whether a single system would be as responsive, effective, and efficient as the two common supply systems presently in effect.
2. The massive effort on the part of the Army to improve its supply posture in support of the increased role of common item support of other services throughout Vietnam while trying to support its own rapidly increasing forces.
3. And finally, the risk of disrupting the support of combat forces by expanding the supply system for common item support was unacceptable (5:III-1-290 and 28:8).

As a result, the Army and Navy continued to share common item supply responsibility throughout the war.

The success of common supply in Vietnam varied among the Services supported. Based on opinions solicited by the Joint Logistics Review Board (JLRB), the Army expressed general satisfaction with the system while the Air Force considered mission support unsatisfactory. The Navy indicated support effectiveness never reached satisfactory levels while the Marines reported no serious impairment of combat capability attributable to common supply support (28:8). Despite these overall impressions, the common supply of certain goods was advantageous, especially for such high volume commodities as subsistence items, selected items of construction material, and POL (28:9). For example, subsistence support was rated "consistently good" by each of the service branches

indicating that the Army and Navy were able to satisfy demands for foodstuffs (5:III-1-291).

Another problem which hampered early attempts to implement an effective common supply system in SEA included the lack of standardization between supply systems in the services. This prevented establishment of common supply procedures to interface with the separate supply procedures of each of the service branches. Different terminology and coding by the different services for the same items also caused confusion. This was gradually overcome with the introduction in 1962 of MILSTRIP (Military Standard Requisition and Issue Procedures) directed by the DOD. MILSTRIP standardized supply forms, priorities, and basic procedures across the services. When it arrived in SEA, in 1963 and later, it greatly reduced cross-service supply support problems.

The use of a common supply system supported by the Army and Navy in Vietnam proved effective in supplying high volume commodities when a fairly predictable demand rate existed. However, such a supply system satisfies only common requirements and does not eliminate the supply systems for items unique to each of the services. Such a system can, as evidenced in Vietnam, reduce the burden on each of the services' supply system by providing common high consumption items through a single source management system.

V. Lessons Learned and Recommendations

This chapter contains a summary of supply lessons learned during the Vietnam War in the areas of supply researched for this thesis. Recommendations to correct deficiencies or prevent recurrence in future confrontations are provided.

MOB/FOB Concept of Operation

Lesson Learned

Though tactical operational capability was achieved in SEA, shuttling aircraft between MOBs and FOBs proved to be costly and wasteful of flying hours, aircrews, and maintenance/supply personnel. Establishment of MOBs in-country after 1965 significantly reduced the NORS rate as a result of the increased supply authorizations associated with a more permanent operation.

Recommendation

Every effort should be made to locate permanent base support facilities, including a fully manned and equipped supply and maintenance function, as close to combat forces and equipment as is operationally feasible.

STAR Resupply

Lesson Learned

The Speed Through Air Resupply (STAR) program, initiated to provide direct air logistic support to tactical units TDY

in SEA, did not have the capability to support massive logistics support required by U.S. forces in SEA.

Recommendation

Logistics strategists should plan to implement immediate sealift logistic support in any future contingency. Airlift of essential supply requirements would sustain forces for only the initial and limited phase of a conflict of any magnitude. Therefore, it is imperative that an overwater logistics pipeline be set up at the onset of any confrontation involving U.S. forces.

Push Supply Procedures

Lesson Learned

"Pushing" supplies and equipment into a combat theater is an effective means of providing immediate supply support to combat troops. This method is essential if, as in the case of the Vietnam War, a logistic infrastructure is not established prior to the deployment of troops into a combat area. Problems that can occur, as illustrated by Bitterwine, include placing an unmanageable workload on the receiving and accounting functions of the existing supply activity. Excesses occur when receipts are not properly accounted for, additional requisitions are processed, and duplicate shipments are received. Excesses also result when the contents of push packages are not tailored to the specific requirements of combat troops (based on geography, climate, type of conflict, etc).

Recommendation

If "push" shipments are necessary in future conflicts, the AFLC must insure the receiving supply activity has the capacity, in terms of manpower and computer capability, to receive pushed shipments and maintain accurate material status records. This will reduce excesses by increasing item visibility and reducing requisitions for items already in stock. Tailoring push packages through improved communication between the wholesale supplier (the AFLC and the AMAs, now Air Logistics Centers (ALCs)) and the end users can significantly improve package contents and reduce excesses. And, finally, combat supply operations should revert to a "pull" resupply as soon as practical.

Logistics Personnel Deployment

Lesson Learned

As stated in 3., a "push" supply system is essential whenever a supply infrastructure has not been established in a combat zone prior to the deployment of combat troops (as was the case in Vietnam). However, the "push" of supply items into Vietnam resulted in a number of problems (as discussed in Chapter III).

Recommendation

The key to effective logistics support of combat forces in future confrontations is establishment of a supply infrastructure prior to troop deployment. The highest possible command support priority should be given to the deployment of logistics support personnel and supplies ahead

of combat forces. This concept should be implemented in peacetime exercises as well as combat operations.

Gray Eagle (Harvest Eagle)

Lesson Learned

This operation was successful in supplying initial housekeeping, messing, and electrical support. However, packages were not tailored to specific geographical areas. Much of the equipment was of World War II vintage and did not meet the specific needs of bare base operations in Vietnam. The packages were not designed for air transport or rapid assembly in a combat area.

Recommendation

The USAF should continue developing and prepositioning lightweight air transportable modular facilities and equipment to support future contingencies. Various packages should be developed which are capable of supporting combat operations in different areas of the world (ie. tropical support packages, desert support packages, cold weather support packages, etc). This would decrease excesses since unneeded items (such as heaters in SEA) would be not included in a particular kit. These packages would require constant updating to reflect changes in operational requirements and improvements in product design.

Computer Support of Supply Operations

Lesson Learned

The use of the standard base supply system (1050-II

computer) in the initial stages of the troop buildup in Vietnam would likely have increased the effectiveness of supply support and item visibility, reduced supply personnel requirements, reduced inventories, and kept excesses to a minimum.

Recommendation

The Air Force should employ standard base supply accounting procedures and equipment (especially the use of computers for supply management) at the forward supply locations at the onset of any future conflicts requiring supply support. Backup inventory management systems should be remotely located at those locations in the event the primary system is destroyed. The hardware should be designed to withstand the rigors of a combat environment (temperature, humidity, dust, etc.) and be air transportable. It should also have self-contained power to permit continued functioning if the base electrical supply fails. It is imperative that a computerized inventory management system be in-place at the start of hostilities and prior to the influx of logistics support items.

Computer Personnel Training

Lesson Learned

In 1965, Air Training Command began training supply personnel in computerized (UNIVAC 1050-II) supply procedures. Since supply accounts in Vietnam at the time were managed using either manual procedures or the punch card

accounting machine (PCAM) system, supply personnel in SEA required retraining in the those systems.

Recommendation

Employment of standard base supply account procedures and equipment throughout the Air Force will eliminate the need to retrain supply personnel in different procedures and on different types of accounting equipment.

Personnel - Tour of Duty

Lesson Learned

During the Vietnam War a normal tour of duty for personnel was twelve months. This caused a number of problems in Vietnam which seriously degraded combat capability. In the case of supply, incoming personnel required substantial training in theater supply procedures. Half way through a tour of duty these individuals would receive Rest and Relaxation (R + R) for up to thirty days. And then, just as individuals were becoming experienced in theater operations, it was time to return to the U.S.. Not only did this prevent formation of a cadre of experienced personnel but it also disrupted the continuity associated with a more stable supply organization. In addition, the logistics of deploying a half million troops into a combat zone annually while redeploying the same number, as was the case in Vietnam in 1968 and 1969, was aw some. And that does not include the logistics involved with R + R operations.

Recommendation

Deployment of military personnel in future contingencies

should be for the duration of the conflict. This would increase both the experience level and continuity of support to operational forces.

Supply Storage Facilities

Lesson Learned

The lack of adequate warehouse space in Vietnam caused inventory items to be stored outdoors or in temporary, inflatable shelters. Losses resulted from the deteriorating effects of the weather and from pilferage due to the difficulty in providing security for items stored under these conditions.

Recommendation

The Air Force must develop minimum essential dedicated supply storage facilities. In addition, command priority for their movement and erection must be given during the initial buildup period in any contingencies or exercises. These facilities must be lightweight, air transportable, and capable of being erected and outfitted in minimum time.

Excesses

Lesson Learned

A number of AFLC initiatives were designed to deal with supply excesses in SEA which resulted from push supply programs and inadequate inventory management procedures. Two such programs, Projects RIPE and EASY were generally considered successful in redistributing unneeded supplies and equipment in Vietnam. However, avoidance of excesses through

effective inventory management and provision of suitable storage facilities would have reduced excesses in Vietnam.

Recommendation

Excesses in future confrontations, although inevitable, can be reduced by more effective management of combat supply inventories (especially through use of computers), emphasis on providing adequate supply storage facilities, and tailoring of push packages contents based on actual requirements of deployed forces.

Wholesale Supply System

Lesson learned

During the Vietnam War wholesale supply support was provided through the five CONUS AMAs which were centrally controlled by the AFLC. This method of centralized control and decentralized operation provided effective support to combat forces in Vietnam.

Recommendation

Continue operation of the wholesale supply system under the centralized control, decentralized execution concept.

DSA/GSA Support

Lesson Learned

The DSA and GSA provided integrated materiel support to U.S. military forces during the Vietnam War. It represented the first time that integrated materiel management of supply items had been tested in combat conditions. Both agencies had trouble maintaining sufficient levels of inventories as

the rapidly escalating war placed greater supply demands on their inventories. The major cause of their reduced logistics responsiveness was the fact that neither agency was geared for wartime supply support requirements.

Recommendation

Both DSA and GSA must maintain adequate supply reserves to support the initial requirements of current contingency plans.

Subsistence Support

Lesson Learned

Initial food service operations in SEA used field equipment from Gray Eagle kits. Intended for bare base operations, these kits lacked adequate refrigeration to support more permanent messing operations. This meant that prior to October 1967, combat forces in Vietnam dined primarily on B rations (which consisted of canned and dry storage items which did not require refrigeration). To support the continued force buildup, temporary facilities were converted to dining halls to augment the Gray Eagle kitchens. Difficulty in providing security for these temporary facilities resulted in unauthorized withdrawal of inventory items and poor inventory management.

Recommendation

Development of fully deployable messing facilities with initial stocks of foodstuffs and permanent type food preparation equipment (including adequate refrigeration

units) is warranted. Development should include a smaller unit which could be air transported for immediate support of combat troops (similar to a Gray Eagle package). In addition, a more substantial unit with initial subsistence stocks and complete refrigeration and food preparation equipment should be developed, capable of providing complete food preparation service to deployed forces. These units would require overwater transport and would supplant the smaller units upon arrival and set-up in a combat environment. Both units would require personnel trained in the set-up and operation of the respective units.

Exchange Services

Lesson Learned

During the Vietnam War exchanges carried many luxury items such as diamonds, golds, and stereos while often experiencing out-of-stock conditions for essential items such as razor blades, shoe laces and soap powder.

Recommendation

The supply of luxury items to U.S. forces in a combat zone is a wasteful use of critical logistics resources which cannot be condoned in future conflicts. Exchanges in combat zones should only carry the essential items required by combat personnel.

Recreational Services

Lesson Learned

Recreational facilities on major bases in SEA included

Olympic size swimming pools, large gymnasiums and lighted ball diamonds to mention a few. Construction, maintenance, and operation of these facilities placed an increased burden on the already overburdened logistics system in-being and detracted from more vital wartime needs.

Recommendation

Realizing that troop morale is an important element in a successful military campaign, attempts to create an "at-home" atmosphere can heavily tax limited resources and place a restrictive burden on the logistics pipeline. A common sense balance must be maintained between morale support items and essential wartime support requirements.

POL

Lesson Learned

The supply of POL products for operational requirement in SEA, although sometimes very costly, effectively satisfied USAF demands throughout the Vietnam War. Storage of POL resources represented a significant challenge to POL managers. A number of different (mostly temporary) storage methods were employed to store POL products including off-shore tankers, rubber bladder, and any other container capable of storing fuel. In the final analysis, the overall costs of providing petroleum products were far higher than would have been the case of an early decision had been made to construct sufficient permanent steel storage tanks. The use of off-shore floating tankers for the storage of POL products was possible in Vietnam only because U.S. forces

possessed air and sea superiority. As a result POL resources were never threatened by enemy actions. This method of POL storage cannot be depended on in future conflicts as a means of fuels storage since absolute control of off-shore waters is less than likely. Plus, future conflicts may not occur close to shorelines.

Recommendation

Logistics planners need to concentrate on developing more permanent POL storage containers that disassemble for ease of shipment and may be re-assembled in minimal time in a combat zone. This will reduce the overall cost of POL storage and present a less vulnerable target than floating storage. In addition, a practical means of moving POL products from tankers to permanent storage must be developed.

Air Munitions - Incomplete Rounds

Lesson Learned

The lack of complete rounds of air munitions in 1965 through mid-1966 significantly decreased the available air munitions causing cancellation of planned combat sorties and reduced bomb loads on combat missions actually flown. In March 1966, it was determined that one-third of the total tonnage air ordnance in SEA was comprised of incomplete rounds. Limited assets, combined with a lack of component parts, caused USAF air munition expenditures and sortie rates to drop. For example, in April 1966, 367 scheduled strike sorties were cancelled for this reason.

Recommendation

The USAF should plan ammunition storage and distribution by complete rounds to the maximum extent practicable and strive to reduce the number of components necessary to assemble a complete round.

Air Munition-Lack of Qualified Personnel

Lesson Learned

From 1965 to 1967 significant problems were encountered in air munitions support due to a shortage of personnel trained in non-nuclear munition specialties. Because of the Air Force reliance on the Army for CONUS management and storage of non-nuclear air munitions, there was a serious shortage of qualified munitions personnel at the outset of hostilities.

Recommendation

The USAF must maintain a conventional munitions career program to assure a cadre of personnel capable in non-nuclear air munitions handling procedures, thereby insuring the availability of experienced personnel to support future contingencies.

Air Munitions Stockpiling

Lesson Learned

Munitions stockpiling is essential to contingency preparedness. However, in Vietnam, most of the air munitions in storage were general purpose bombs of Korean War vintage, compatible with older type aircraft. Critical shortage of

more modern ordinance resulted in cancellations of programmed jet sorties.

Recommendation

Sufficient stocks of modern air munitions must be maintained to meet contingency plan requirements. This level should be adequate to meet estimated combat needs until munitions production matches combat usage.

Air Munitions-Floating Storage

Lesson Learned

As in the case of POL, the use of floating storage for munitions proved effective in Vietnam due to U.S. force superiority in the air and on the sea. However, it is unlikely that our forces will achieve such total control in future confrontations and floating storage for munitions presents a very vulnerable target for enemy forces.

Recommendation

Development of munitions storage facilities which can be broken down for ease of transport and re-assembled in minimal time in a combat environment should receive top priority.

Single Manager Supply of Common Items

Lesson Learned

The concept of employing a single manager supply system to provide high volume common use items such as subsistence items, selected construction materials, and POL was generally considered very effective in Vietnam. However expanded use of the system in the early buildup was hampered by a lack of

standardization between supply systems in the service branches.

Recommendation

Standard DOD supply procedures now in use, including common item identification, should allow increased use of the single manager supply concept in future conflicts and reduce the burden on each of the services' pipelines.

Combat Supply Requirements

Lesson Learned

Difficulty in accurately predicting combat supply requirements degraded the logistics support of Air Force combat capability. This caused a significantly high NORS rate for combat aircraft in 1965, 1966, and part of 1967. This was due to the lack of combat spare parts usage statistics.

Recommendation

The Air Force must train during peacetime as it expects to fight during wartime. This not only maintains our forces in a wartime fighting posture but also provides supply usage statistics which more closely approximates actual combat requirements. This would allow logisticians to better predict the supply levels necessary to sustain combat capability in a future conflict.

Wartime Commitment

Lesson Learned

Neither a formal declaration of war nor state of

emergency was ever declared in Vietnam. This projected the appearance of a lack of commitment and resolve on the part of the U.S. to win the war. This also translated into other difficulties such as:

1. A delay in changing supply accounts in SEA from peacetime priority to wartime priority.
2. An unwillingness of industry to respond to procurement requests for military requirements over civilian interests.

Recommendation

The total commitment of the United States in terms of forces and resources (weapons systems, support items, POL, etc) is essential to achieving successful outcomes in future conflicts.

Logistics History

Lesson Learned

This study has concentrated on the United States Air Force supply support network that existed throughout the Vietnam War. The objective was to review logistics related problem areas in order to learn from those experiences so that the lessons learned in Vietnam would not have to be re-learned in a future U.S. military involvement. It is important that logistics planners and support personnel at all levels understand and be familiar with these lessons along with logistics lessons learned from other wars in order to be better qualified to address future logistics support requirements.

Recommendation

A course in logistics history should be developed and included as an integral part of each logistics officers' professional military education. The course could be offered through a correspondence course or in-residence at the Air Force Institute of Technology School of Systems and Logistics.

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Vita

Major Randall P. Ray was born on 12 October 1949 in Lockport, New York. He graduated from Barker Central High School in 1968 and went on to receive a B.S. degree in Mathematics from the State University College at Brockport, New York in 1972. In June of 1973 he was commissioned through Officer Training School and was assigned to undergraduate navigator training at Mather AFB, Sacramento, California. Upon graduation he was assigned to C-130s at Pope AFB, North Carolina. In 1982, he was reassigned to Royal Air Force base in Mildenhall, England where he served in aircraft command and control for two years and as chief of Combat Plans for two years. During that tour he earned a M.B.A. degree from Troy State University.

Permanent Address: 8514 Lake Road
Barker NY 14012

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BLOCK 19. ABSTRACT

This study investigated the United States Air Force (USAF) supply support network that existed throughout the Vietnam War. The analysis concentrated on supply related problem areas and associated lessons learned with the intent to prevent similar occurrences in future conflicts.

The research was limited to USAF supply operations in Vietnam as they existed in the early sixties when USAF requirements were minimal, to the evolution of a significantly more sophisticated structure which was essential for support of steadily increasing force levels. Included is a historical background of the Vietnam War which describes the events which steadily drew the United States into the conflict and the resultant USAF force buildup. The historical background provides a perspective from which to view supply related problems as the USAF logistics function transitioned from a peacetime orientation to a wartime support structure.

USAF supply initiatives designed to meet the demands of increased combat operations are discussed. Included are AFLC sponsored supply programs such as GRAY EAGLE and BITTERWINE which "pushed" supply items into Vietnam automatically. The wholesale and base supply systems, and the critical relationship that existed between these functions during the Vietnam era is also examined. The supply functions of services, and petroleum, oils, and lubricants (POL) and munitions are studied with the intent to identify particular problem areas in each of the sub areas mentioned and the deliberate steps taken to correct those problems. The employment of common supply support in Vietnam is also presented.

The study concludes with a summary of supply related lessons learned along with recommendations made to preclude recurrence.

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